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ORIGINAL ARTICLES.

CLINICAL LESSONS.

Hysterical Contractures.

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THESE clinical lessons are, in a measure, the offspring of opportunity. The wards have, of late, given us cases of contracture that have been so interesting and so suggestive as to tempt me to call attention to their diagnosis and especially to their treatment. The subject is in no sense exhausted.

We do not know what hysteria is. So far death has destroyed in all cases what evidence life might have offered as to its existence as an obvious thing capable of visual demonstration; and still we are apt, sometimes with too much confidence, to refer back its manifestations to this or that center. Thus, it has been taken for granted that hysterical contracture is due to disorder somewhere present in such columns of the cord as are usually diseased in cases of spastic paralysis. The chief basis on which this opinion rests is this: Cases of long-continuing hysterical contracture have been seen to end in sclerotic alterations of the lateral columns of the spinal cord. The inference is that the precedent functional states were also due to the less visible hysterical conditions of these columns.[1] Moreover, it has been taken for granted that the state of contracture is analogous to the condition we find present in muscles rendered over-responsive by lateral sclerosis.

I am not at all secure that these inferences are safe, or even that contracture is of a certainty due to spinal centers at all. It is quite possibly purely local and muscular as to origin; and, indeed, there are reasons why it is extremely difficult to consider it as of spinal birth, or in any way analogous to the state of excitability seen in disease of the lateral columns.

The history of contracture is briefly this: Under an influence, such as emotion, or from causes unknown, but usually in a frankly hysterical case, a group or groups of muscles contract abruptly or by degrees. These spasms may involve flexors or extensors, or both at once. They may affect one muscle or almost every group in all four extremities, and also the truncal muscles. This condition may last for days or years. The muscles concerned are not over-responsive to blows or to electricity. The skin-reflexes are normal or nearly so; the knee-jerk and ankle-jerk may not be in excess. Clonus is absent; if present, indecisive or brief, as we see it in hysteria or in over-excitable, weak people. The prolonged muscular action seems not to raise the local temperature. If you deeply anesthetize the patient or put on an Esmarch bandage, the muscles relax. In sleep some early cases relax; others do not. Very gentle effort in sleep to alter the angle of the limb may succeed, but the least abruptness of pull calls out a spastic response. Otherwise the spasm is constant, and efforts to overcome it forcibly give great pain. Very often there is loss of power in such muscles as are, and even in such as are not, in spasm. Usually there is profound anesthesia, confined to the disordered limbs or involving half the body.

I have said that the spasm is chronic, and this is the rule; but I have seen cases in which it came and went, or was only seen on alternate days. Quite often the flexors or extensors alone are contractured, but in the sad examples of general chronic spasm both sets of muscles are apt to suffer.

A contracture may last for years, and go as abruptly as it came—or, it is so said. I have never seen this happen, but I cannot doubt the positive statements made by others.

Under early reasonable treatment these spasms, if locally limited to single groups of muscles, are apt to get well. My own efforts to cure them with discs of metal, magnets, or by hypnotic suggestion have left me with mere histories of defeat. And yet under other treatments I often see these cases get well early. But this is not true of the more extensive contractures; in fact, the more extensive the region affected the more difficult the early treatment.

Now let us look at the graver form of multiple contracture. A patient far gone in the sad drama of hysteria has slowly, or abruptly, or after the part has been paralyzed and become insensible, a contracture of one limb, which gets worse. In a week or two the other limb suffers. Still later the remaining extremities become drawn up, and even the face, neck, belly, and thorax are involved. There are paralysis, surface-anesthesia, and intense spasm. Pain is

[1] Soc. méd. des Hôpitaux, vol. ii, 2d series, p. 24, Charcot.

rare, unless called out by pressure or motion. Usually all the muscles suffer, but the attitude is commonly one of extreme flexion, either because of the greater power of the flexors or that they are the more excited. In some cases the limbs are in extreme spastic extension, or this is the case as to the legs, and not as to hands and arms. Very early in these cases the muscle-muscle reflexes are mechanically abolished or are pathologically interfered with; and later all reflexes may disappear in the disordered parts and direct response to a blow be lost. There is apt to be diminished quantitative muscular response to faradic currents, and years after even galvanic responses may be much lessened. The anesthesia is of the surface and is apt to be at last profound.

Sleep does not relax these cases after they have existed for some months. Great but uniform wasting is seen. The muscles harden. About the joints and between the tendons a similar leathern-like hardening is found. Ether or chloroform no longer causes relaxation; nor does an Esmarch bandage, or even section of the tendons, give rise to relaxation as in the local contracture.

This is a different symptom-group. If we ask ourselves, What has happened? What is the cause? we are at once face to face with a grave and interesting problem. Without a history we would be apt enough to consider such a case as one of anterior poliomyelitis. It is but a sketch of that malady; it is not a true picture. But suppose this patient bed-ridden for a score of years. I have seen such cases, in which the cold, absolutely anesthetic limbs have lost all reflexes, and in which the shrunken muscles refuse to move under any form of electric current, save here and there to powerful galvanic alternations. The picture of an anterior spinal malady *seems* to be fairly complete.

This sad condition belongs only to the multiple contractures. It is never found in the single-limb spasm, no matter how lasting that may be. I have seen contracture of the extensors of one leg endure six years and show no sign of the peculiar permanent hardening that marks the second stage of some more generalized contractures. I recall one case in which for nine years the left gastrocnemial group remained in violent contracture. Then a section put an end to the spasm. To my surprise the muscle thus released from tension was soft and had not shrunk. In both of these cases, when under ether, the relaxed muscle behaved to electricity like a normal muscle.

All of this is unlike what happens in the contractures affecting two or more extremities. Here, even in the very early months, the muscles may begin to show a brawn-like hardness, which is a constant condition and not to be altered by anesthetics. The muscle, at first spasmodically shortened, becomes organically set and stiffened. There is still and always more or less spasm, or at least this may be the case for years. It is also possible that joint-lesions due to long disuse and to subluxations may have finally their share in adding to the complex symptom-group the element of reflex muscular contractions.

You may have already inferred that I have become quite assured that there are two forms of hysterical contracture: one apt to be local and limited and not followed by organic muscular changes; the other apt to affect two or more limbs, and almost every muscle, even of the trunk, and prone to result in the muscular and areolar tissue-changes already described. I think it curious that while the early stage of general contracture is most difficult of cure, when the disease has caused organic changes and is in its second stage it is far less hard to deal with. Perhaps this may be due in part to the disappearance of active hysteria. Indeed it is often true that in certain old examples of contracture the symptom, contracture, exists no longer, and we have to deal alone with the mischief of organically shortened muscles, altered joints, and sclerematous changes in the intermuscular spaces. The hysteria is lost with years; the spasm lessens or ceases; the consequences and additions remain.

I have said enough to enable you to separate this peculiar state from disease of the lateral or from that of the anterior gray columns of the cord. If, however, any other test be needed, it is to be found in the ease and speed with which under rubbing and faradic electricity these wasted muscles recover their characteristic excitability. With this return such reflex actions as had been mechanically obliterated again become visible, but the skin-reflexes remain absent until the anesthesia passes away.

Richet divides contractures into painful and painless. I never saw a case of constantly painful contracture in America. Some of these cases, however, become painful for a reason not always present and which only of late has become clear to me. In general the painless contracture may be made painful by quite moderate efforts to overcome the contraction, and in old cases, such as I shall describe, the pain on movement is in the joints and not in the muscles. In advanced cases of extreme contracture of the legs you meet now and then with examples of agonizing pain, apt to be referred to the feet and never seen in the arm. I had long considered this symptom as of spinal parentage. Some years ago, however, I was led in a seemingly hopeless case to suspect that the very great suffering present might be due to the stretching of the sciatic nerves at the notch and to a possible localized neuritis. A number of tendons were cut and partial extension effected. Immediate relief followed and the pain continuously lessened as extension by instruments became more complete. Encouraged by

this unlooked-for success, the case was attacked with larger hope, and in the end I had the pleasure of seeing a young and intelligent woman restored to a life of healthy usefulness. I happen to-day to have seen this woman; a strong, well-nourished, and apparently vigorous person. Looking back to the gnarled, blind, speechless patient of years ago, it seems a quite incredible rescue. Nothing except the rapid cure in this case shook my belief that very material organic change in the cord had taken place.

So far as my own knowledge goes, post-hysterical sclerosis of the cord occurs only in generalized contracture, after ten or twenty years of life in bed. In one such case I saw, after death, a moderate amount of sclerosis of the anterior columns and gray matter.

With such a symptom-group before us as I have already described as existing in old cases of multiple contracture, it is almost impossible to disbelieve the presence of more or less organic fascial change in the cord. So difficult is it, indeed, that I have often asked myself, if it may not be that organic lesions in hysterical people have a less serious hold on the tissues than such as come in the ordinary way, without precedent hysteria. Either we must accept some such conclusion or else believe that the group of symptoms delineated may occur without having for their parents organic material lesions of central nerve-cell and fiber. I trust I make clear how difficult is this problem.

It is especially interesting to me just now, because I have in my care a young woman whose case is very like that I just now mentioned as fortunate. As our first illustration of contracture and of many of the most remarkable incidents of hysteria, I shall have read to you at length this strange story of disease. It is rare that a record has been kept with the care given to this.

E. M. H., of Arkansas, was a girl fifteen years of age, whose parents were in good health, and who had three brothers and sisters alive and well. The mother had had two miscarriages; one child was born prematurely, and one died of hydrocephalus at six months. A maternal aunt was insane.

The patient was born at term, without difficulty and without instruments, and proved to be a healthy and well-formed baby. She was breast-fed for six months; never had convulsions, and, although she had scarlet fever, her childhood was fairly healthy.

She learned to walk and talk early and well; was, in fact, a bright, intellectual child. Menstruation began at twelve years, and ceased a year before the girl came under observation.

In 1890 the patient had epidemic influenza, without remarkable consequences. The present trouble began in that year. Late in March of 1890 she was running along a wet boardwalk, when she slipped at the end and fell, striking the back of her neck on the edge of the last board. She had to be assisted to rise, and complained of headache for several days. About a week later she tripped in the grass and fell, causing a green-stick fracture of the left radius. As soon as the nature of the accident was understood a plaster-cast was put on the arm, and soon afterward it was observed that the hand had begun to "draw up," and that to extend it was extremely painful. This gave rise to no suspicion, but when the cast was taken off it was found that the arm and hand were entirely paralyzed, had no sensation, a very poor circulation, had shrunk perceptibly, and were blue and mottled.

The spine was examined, and said to have been sensitive in the upper cervical region. The girl declared that tapping it at this time made the knees tremble and ache. She was ordered to bed, applications of ice made to the spine, and bromids and other medication employed. In a few days she became extremely nervous, flighty, and imaginative; had to have the room dark and still; obliged everybody to go about in slippers, and objected to the slightest noise.

Her physician concluded the trouble to be hysterical, ordered the windows opened, and suggested that her parents insist upon an effort to move the hand. The child set her own will to work as soon as she was assured that it was possible, and in a few days was using the limb tolerably well, and was on her feet again, though weak. The hand still remained partially flexed, and rather uncertain in its movements for some time afterward.

Late in June she was taken to a farm in the country, where she steadily regained her strength and flesh, playing with other children, until the middle of July, when there were four excessively hot days. Although she was kept as quiet as could be, on the fourth day the left arm dropped helpless and began to contract, and later to shrink, and became remarkably blue and mottled. Early next morning she staggered into her mother's room, complaining of dizziness. Her mother caught her in her arms, and from that time she has never stood erect upon her feet without aid. She was put in bed, and had a fever in a few days, with a temperature of from 101° to 102°. She was extremely excitable, and had a variable tendency to fancy shapes and sounds about her. Within a few days the temperature became normal. By and by she sat up and played, using both hands and arms freely, and could put out either foot to draw to her the playthings she had dropped from her hands. Still she could not stand. Twice she forgot, and springing up to answer a call dropped instantly on the floor. After waiting for two weeks, thinking she would recover the use of her legs, her parents took her home to her doctor. There was at this time an almost daily perceptible loss of power in the legs, and sensation also began to go, which had not happened before.

By October 1st, twenty-four days after the last fall, the child was without sensation below the knees. Her temperature averaged from time to time from 101° to 102°, with a very rapid pulse, and a slight return of the excitable, flighty condition. The former treatment was repeated, and again

motion was restored in ten days. The hand at this time measured three-quarters of an inch less in circumference at the first joint than the other, and the skin peeled deeply from the ends of the fingers and thumbs, so as in a measure to suggest the kind of change that is seen after an attack of scarlet fever.

From this time on there was a steady gain until September 6th, when one day she lost her balance and fell backward off her seat, striking the back of her neck, a little to the right, at the base of the brain, on the sharp edge of a sill—not a door-sill, but a part of the frame of the barn where she had been taken for her amusement. The blow raised a large lump, and was really severe. She fell doubled up between the step and the wall, and the other children pulled her out rather violently, and she complained that they hurt her back in so doing. This was late in the forenoon. She ate no dinner that day, looked pale and haggard, but said nothing about the matter. Very soon afteward it was observed that there was no motion in either feet or legs, and that the latter had begun to draw up; but the arms and hands were still untouched by this disastrous trouble.

By October 15th the knees were at a slightly acute angle, and still drawing up. Any attempt at extension caused great pain. The girl was still able to sit up, but complained that her back was constantly tired. Finally a rung was sawed out of her low chair in order to let the feet draw back under it. On October 19th, while sitting busily crocheting, her right hand fell suddenly in her lap, and a minute later the left, and neither moved again for twenty-seven months. In less than a week both arms had drawn up to a right-angle, the fingers and wrist were bent in flexion upon the arms, and both arms and legs were totally devoid of sensation. After this the child could not sit up any more, pain in the spine being constant at the lower part, chiefly in the dorso-lumbar region. The sphincter muscles of the bladder and rectum were at this time sometimes in a relaxed condition and allowed everything to pass, and at other times violently contracted so as to make the discharge of urine or feces for the time impossible.

For days the little patient was an entirely helpless person, except for the ability to move her head from side to side. About November 11th chloroform was fully administered, but the tendons did not relax, and it required the efforts of two physicians to extend the arms and legs, so as partially to straighten the joints. Next day there was a decided change for the worse. Spasmodic contractions of the neck and pectoral muscles set in. The girl could not swallow even liquids. Food was then given by injections for some days. It required an hour for her to relieve her bladder, and at this time the urine was heavily charged with phosphatic deposits, so that in a pint they were one or two inches deep.

All sorts of things happened in the next few weeks. The tongue was drawn to one side on occasions, so that the teeth rubbed the skin off it. The child became blind and nearly entirely deaf. The pectoral muscles occasionally contracted powerfully, so as to draw the arms across the chest, or to draw the chest into a deep concave, and make breathing impossible. On other occasions the head was jerked violently from side to side, even in sleep, and the girl would rise from the pillow and go to and fro with a pendulum-like motion, and then fall back, still asleep, or apparently exhausted.

There were constant spasms of the diaphragm, during which it seemed that the child would never breathe again. Her temperature during this time varied from 95° to 101°, sometimes making this extreme excursus within two hours, the pulse being then from 130 to 180, and respiration beyond the possibility of counting. Meanwhile emaciation increased; sleep became almost impossible, even with copious doses of codein, seldom lasting more than from thirty to sixty minutes, and once in twenty-four hours. At this time it was necessary to tie her head down to give her any rest at all. Ice was kept on the whole length of the spinal cord, an ice-cap was placed on the head, and in these measures the patient seemed to find more relief than in anything else. There was a broad red band across her forehead, very difficult to describe, and deep streaks down both her cheeks, of an intense red. Her eyelids sometimes remained open for long periods, and at others were shut for hours, so that she could not open them. Again, the eyes themselves would move independently, sometimes one rolling upward and the other downward, or one outward and one inward, producing a most extraordinary appearance. "Every hour for weeks," said her mother, "we expected to see her draw her last breath; nor were we alone in the belief that it was impossible that she should come out of this condition and live." "I should have mentioned also," added her mother, "to withhold nothing of interest, that she passed entire days in a comatose condition, and others in a state that could more aptly be described as a deep sleep."

During this long period the girl was fed entirely by the bowel, and was rubbed with oil and brandy, the throat and mouth being sprayed with water and glycerol every few minutes. On December 16th came what is described by her parent as the crisis. She had alarming spasms of the diaphragm, much longer than the preceding ones. Then they suddenly ceased, and did not return for three years. There was a slight relaxation at this time of all of the contractions, and the patient was rather more comfortable. In a few days afterward she began to swallow a little, but at this time she was entirely blind; she had also no sense of taste. The smallest amount of water swallowed caused extreme pain, and the slight effort of masticating or swallowing food gave rise to profuse perspiration and indescribable weakness.

It was characteristic of the hysterical nature of the case that at this time the girl could sometimes be fed by means of fancy spoons, letting her feel the patterns with her lips or tongue. About this time she began to take potassium iodid, increasing the dose as fast as the stomach could bear it.

On January 9, 1891, she was able, with effort, to tell the number of fingers held up close to her

eyes, and on January 16th could distinguish outlines and bright colors.

On March 1st her sight became good in the right eye; it had never, until very lately, returned fully to the left eye. She could see things less distinctly with the latter.

Fearing the effect of heat upon her (as she manifestly lost ground when overheated; her legs drew up more forcibly, and she lost flesh as the warm days came on), her parents were advised to take her to the mountains for the stimulus of a rarer atmosphere and the coolness of the high altitude.

A cot was made, which was swung on solid rubber ropes to save jarring, and she was carried up Roan Mountain, 6394 feet high. She began at once to sleep well, eat well, and move with ease. At this time the hands were still twisted together at the wrists, and tightly clenched. She also had the embarrassing symptom of violent protrusion of the rectal mucous membrane, which would come down suddenly in her sleep. If it was not pushed into place at once, it seemed to be caught, and then it became congested, and its return was exceedingly difficult.

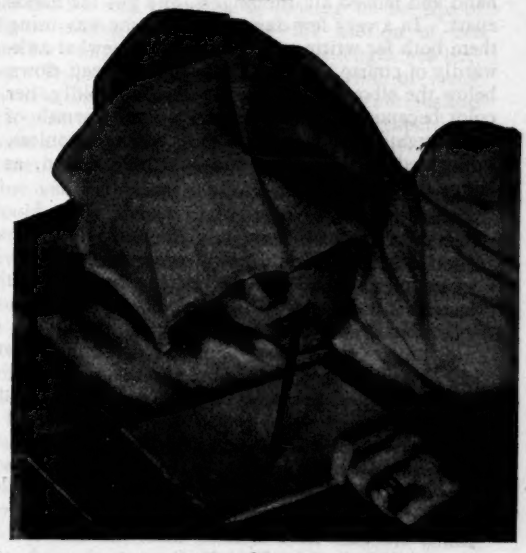
At this time the legs were still contracted and motionless; both knees were subdislocated; the left foot was laid up over the right thigh, and the right foot on the left thigh. Both feet were drawn into a sharp curve, and the toes were drawn under so tightly, and so close together, that it was impossible to draw a rag under or between them. Quantities of iron and potassium iodid were given, with occasional cessation of the treatment, to let the stomach recover its tone.

The child's parents remained on the mountain with her from June 6th to October 16th, and then returned to her native town. During these four months she had gained thirty-three pounds in weight, having weighed in June forty-five pounds and in October seventy-eight pounds. On her return she instantly ceased gaining flesh, was again attacked by influenza, and was wretchedly weak all winter, and had to be watched closely, and continually kept cool, insisting upon the windows being open day and night, although the thermometer was often at zero. Her physician urged her parents to hasten away early in the spring, and accordingly they started in April, waited a month at the foot of Roan Mountain for the snow to melt, and moved over the mountain to Glen Ayres, 4500 feet above the sea-level, on the south slope. As before, the girl began to pick up at once. Sensation, which had crept down from the shoulders the previous summer nearly to the elbows, began to be manifest below the elbows.

In June, 1892, menstruation began. The girl was then twelve years and eight months old. There was no general disturbance of the system at this time, beyond slight backache and headache, and no hysterical manifestation. The menstruation continued with perfect regularity and in good quantity until December, 1893, when it ceased, and never again recommenced. There has never been any unnatural discharge or any complaint of pain or uneasiness at the menstrual period, except that caused occasionally by retention of urine.

There was a general access of strength and flesh during the summer of 1892, and in September the family moved again to the summit of the mountain for the winter, fully determined to test the value of altitude in the child's case. In the meanwhile, unable to use her hands, the little one learned to write and draw beautifully with pen and pencil in her mouth,

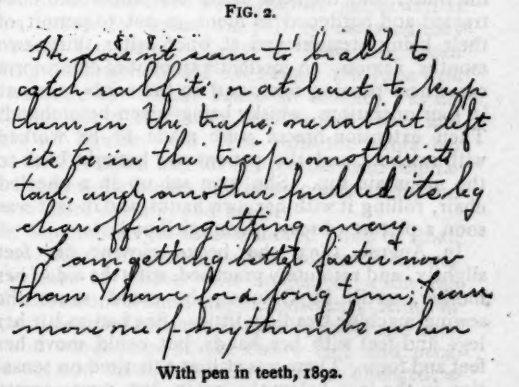
FIG. 1.



E. M. H.: Writing with pen held in mouth.

holding them firmly on the right side between her teeth, and moving the head. She complained that the other side of her mouth was "left-handed." She

FIG. 2.



With pen in teeth, 1892.

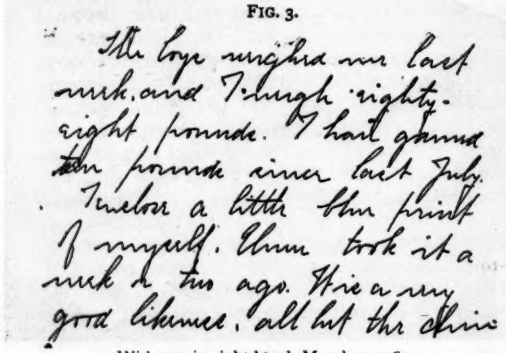
conducted in this astonishing manner a large correspondence, entirely by herself, except the folding of the letters and placing them in the envelops, the hands being still clenched and twisted as I have described. Fig. 1 illustrates her mode of writing.

The winter was extremely severe on the mountains. During January it was impossible to keep the temperature in the living-room up to 32°. Most of

the time it was from 20° to 30°. For some weeks previously the girl had been able to move her right thumb a little, and on January 13th she opened that hand, moved all the fingers, but could not separate the wrists, which, if I have made the matter clear, I should have described as being pressed violently one against the other.

January 15th, two days later, she opened the left hand and moved all the fingers, and got the hands apart. In a very few days afterward she was using them both for writing and knitting, somewhat awkwardly of course. Sensation began to creep down below the elbows; her flesh increased rapidly, her color became good, and there was more warmth of the extremities. Her legs were still motionless, subluxated at the knees, and violently drawn, as before described.

FIG. 3.



With pen in right hand, March 19, 1893.

In April she was taken to Professor Allen, of Indianapolis, who cut the cords in the groins and under the knees. The joints had grown out of shape, so that it was impossible at once to straighten the limb; and the skin under the knees had contracted and hardened so much as not to permit of their being straightened at once, after thirty-two months' flexion. A moderate amount of chloroform came near proving fatal, and so the cords were cut in four operations, whisky being given beforehand. Then extension-braces were made to be worked with ratchets, and the patient was brought back to the mountain-top. She soon sat up in a wheeled chair, rolling it with her own hands, and in fact was soon a picture of rosy, plump girlhood.

In August, 1893, she began moving her feet slightly, and resolutely practised, with the aid of her mother, until, in October, she could move the sewing-machine treadle a little. She had to lift her legs and feet with her hands, but could move her feet and toes. There was still at this time no sensation in the legs below the groin, but it was pretty good in the arms, and she could feel a needle almost down to the knuckles of both hands. The knees had been forcibly extended daily by the use of instruments until the angle was extremely slight. This process was very painful, always giving rise to great distress in the lumbar vertebra. Several attempts to stand with assistance caused extreme torment in the same region.

On September 30th the child was taken in a buckboard wagon several hundred yards, and again on October 29th; she seemed to enjoy her first and only "rides."

On November 2d she appeared languid; her back hurt her more; she could not sit up, but preferred to lie still all day. She was carried down stairs as usual to lie on a couch, and the stretching at that time was omitted and never resumed. After this she did not sit up. Two weeks later there was a slight menstrual discharge; her appetite failed, and her strength gave way. For the first time in five months it was necessary to put ice-bags on the back of her neck. In other words, she had a very serious relapse.

On December 9th she could not be carried down stairs, and was not taken down stairs again until May. Her parents had intended to move down to Roan Station for the winter, but did not think it advisable to disturb her.

Violent palpitation of the heart came on; the pulse was 160, hard and bounding; the temperature was only 97°; the respiration very rapid. At this time the physicians who saw the girl were again satisfied that it was impossible that she could live much longer.

On January 12, 1894, she had serious ulcerations of the mouth and throat; her breathing became as rapid as from 90 to 160 per minute; her pulse quick, weak, and wiry. The urine was exceedingly scanty and dark. The legs became again motionless; the cords contracted at the knees; the hips and the arms were still free, as they had been before, but increasingly numb.

At this time there came on also a great difficulty in speech. Ice was now used on the head also, and again the child desired to have all light and sound excluded. On January 20th she spoke once: "Mamma," she said, "it hurts," and never afterward, up to the time of her falling under my own care. Nor, in fact, did she make in this period an articulate sound, asleep or awake. The vocal bands were relaxed at this time, and are said to have been ulcerated. The legs were drawn almost up to the body, but there never was as much contraction of the thigh on the pelvis as of the leg on the thigh.

The girl could still express herself in writing with her hands, but complained that they were weak and numb, and she feared, as she wrote, that they were "going again." On February 10th she had violent contraction of the abdominal muscles following an enema; convulsive shudderings for a time ran over her body, and her hands and arms in an hour were completely paralyzed.

From February 10th till March 3d she had no discharge from her bowels. On February 14th she had great difficulty in expiration; she would fill her chest to the utmost degree with air, and then remain half a minute sometimes without expelling it, and finally would drive it out in jerking whiffs, her head moving violently to and fro as she did so.

At this time there was great difficulty in swallowing, and occasionally swallowing was followed by some violent convulsive efforts, during which the blood would fly forcibly from the nose and mouth. Two hours or more were required to swallow two or

three ounces of milk, and nourishment was mainly given by enemata. At this time some effort was made to knead the bowels, but every attempt caused contractions of the bowels so violent that the muscles would spring into stiff cords, and thus remain for hours, while the urine had to be drawn away, and was brown and exceedingly offensive, but without blood.

The difficulty in expiration of air lasted until all the spastic contractions had ceased, and the legs were motionless, like the limbs and head, the child using the diaphragm only at brief intervals. At this time codein was used hypodermically.

On March 3d there was a temporary cessation of contractions, and the bowels were moved, and this was the last motion until March 29th. During all this time the patient was fed chiefly by enema; nothing passed away, everything being absorbed with astonishing ease.

After February 10th all communication was made by the eyelids; the child could no longer use her hands or her speech, even in the faintest whisper; but when she wished to indicate anything she would wink several times, and cards were held up containing the alphabet, and when the right letter was reached she would wink.

On March 12th continuous convulsions of the head, arms, bowels, jaws, and tongue set in. All food and drink were given by the bowel and by outward application. Again there was a deep crimson flush all over the head, and it was needful continuously to keep ice on the neck and head. The facial and temporal arteries were of the size of large lead-pencils; all were throbbing so violently that their pulsations could be counted across the room.

On March 22d the convulsions were so violent as to require men to hold the child, and at this time it was observed that the urine became of an extraordinary odor, described to be like that of the cat. On March 25th she was totally deaf, partially blind, and entirely speechless. She could not feel a needle anywhere in the body, except in the lips. The skin was rough all over the body, and looked and felt like sand-paper, presenting an indescribable dry roughness.

At this time any attempt to comb the hair was followed by bleeding from the scalp, and the hair fell out in handfuls. Emaciation became extreme. All of this time the girl had an exceeding sensitiveness as to heat, and the breathing would become terribly difficult if the windows were closed, so that her family were obliged to keep the sash up and the transom over the door open on the top of the mountain, with the thermometer frequently down in the neighborhood of zero. Her nurses, as may be imagined, suffered severely under this *régime*.

On March 29th her convulsions ceased. On April 4th she had discharges of green and yellow pus, in remarkable quantities, from the ears and nose, as well as from one or two abscesses, which had to be opened, in various parts of the body; one on the side of the neck appeared to be very serious. Shortly after this her sight began to return, and it was soon found that she was reading the motions of her attendant's lips, although stone-deaf, and very soon she understood every syllable, when the light was good and faces were turned squarely toward her. From this on for months she continued to improve in this accomplishment. Her family learned for her use the deaf-and-dumb alphabet, so that she communicated with them either by speaking with her own lips, so that her mother read them, or by looking at the lips of those talking, or by seeing the motion of her mother's fingers, when her sight at length was better. Following this there was a period of many months during which she was subject to curious and frequent attacks of congestion of the superficial veins all over the body. The whole body would sometimes become mottled blue, as if a coarse blue veil were drawn over it; the lips and eyelids would grow almost black, and breathing become exceedingly difficult. It was then necessary to give stimulants quickly, and to sponge the body with cold and hot water, and renew the hot-water bottles, and do quick work, in order, as it seemed to her family, to save the child from death. A little excitement, or a too warm room, would in a minute bring on one of these remarkable attacks. The last attack of this sort occurred in September.

Early in May she began to chew a little; she could swallow no solids, and only from one-eighth to one-fifth of the fluids attempted; the diet was still chiefly by enema. On May 2d Dr. Allen, who saw her, expressed his surprise that she was still alive, and it did not seem possible then that she could live from hour to hour, although she had been really convalescing for nearly a month. She was breathing entirely with the diaphragm at this time; the lungs were congested and full of râles, and up above (that is to say, in the costal region) quite motionless.

From this time there were gradual gains, and it seems useless to repeat the roll of extraordinary hysterical symptoms. Early in June she began moving the fingers of the left hand. On June 13th she was able to "shake hands all around," as she said, and could swallow a little solid food, and nearly all liquids. On June 19th she wrote her name for Dr. Allen and for her mother, and respiration began to be deeper and more comfortable, and she was more cheerful and happy.

On September 13th she was moved down to Roan Station, 2650 feet above sea-level, where the air was not so rare as before. On September 28th, the third consecutive warm day, the mercury being at 80°, a violent inflammation of the eyeballs and eyelids and congestion of the entire face and neck came on, and lasted until the weather changed, a week later. At this time the child began to make her right hand hold the work for her left hand. The left hand and arm were quite free and vigorous, although there was no feeling as yet in any part of them.

Every warm day in October and November brought back symptoms similar to those already described, but the prompt use of cold applications stopped the attacks.

On November 26, 1894, four years and three months after the second injury, and four years and

nearly eight months after the first injury on the boardwalk, and thirteen months after the last relapse, the sight was good in the right eye; dim in the left eye. The ear-drums were said to be congested, but she distinguished many sounds through a trumpet, if one spoke loudly; and almost all the alphabet, except *w*, after four or five repetitions. Often she could not distinguish both syllables of a two-syllabled word, not even her own name. After the first efforts her deafness seemed to increase. At this time she heard the letters better on cold days than on warm days. High-pitched voices hurt her.

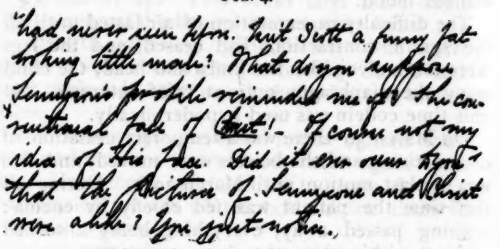
On examination of the ears no perforation of the drums was found, in spite of the free discharge from the ears. Inflation of the Eustachian tubes was attempted, but could not be borne. No effort at articulation was possible. Comparatively little food could be taken, but it was swallowed more freely, and only a little thrown out by the tongue, although some food was still given by injection.

Although there was a gradual gain in flesh and strength, sensation returned late in both arms above the elbows. The right hand recovered its motion and held the work so as to enable her to use the needle with her left hand; or else she would hold the pen in the right hand for writing, and guide the whole organ with the left, seizing it at the wrist with the left hand.

The limbs remained unchanged, the feet crossed and drawn. The patient lay nearly all the time at this period on the right side, and could not bear lying on the spine at all. There were a great many râles in the right lung, and what was described as emphysema and congestion, but the pulmonary condition was better than a month before. The temperature was usually half a degree above normal; the pulse always a hundred or more, and easily increased. The girl at this time could not bear a temperature of over 70°, whether natural or artificial, and had to have plenty of air. The stomach could not hold much food at a time; efforts to feed her produced contraction and pain and a threat of return of bad symptoms. The bowels were only moved by copious enemata; the discharges were slow and difficult, by reason of weakness. A good deal of mucus passed, frequently in large shreds. The bladder was subject to involuntary and frequent passages. The child was aware when these would begin, and could sometimes, though not often, start them, but could not stop them. The skin had become natural in texture and of a good color. There had been no bedsores recently; there had been one on the head in March, but it had healed up very readily. The right ear, I should say, had a large piece worn out of the rim—a deep notch caused by the jerking of the head on the pillow in February and March of the year before. This had long since healed. The spine was very tender; the child could not bear to have it touched; the muscles alongside of it were also very sensitive.

The mother added that at this time the girl was fifteen years of age; that she had grown symmetrically in the main; that if she ever walked she would not be noticeably under-developed anywhere. The feet were rather small, but not deformed; and the hands, like the feet, were of good shape. The child's mind was phenomenally clear and keen, her memory inexhaustible, and her patience very great. Her intelligence, as her mother said, was almost clairvoyant.

FIG. 4.



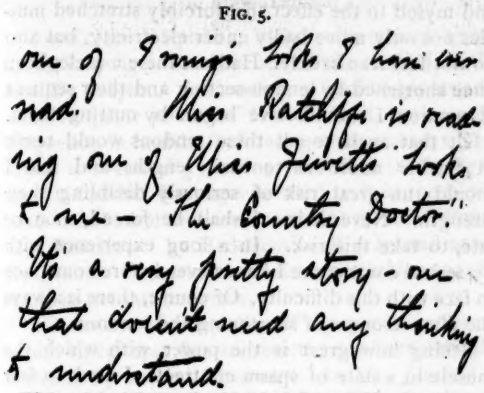
With pen in left hand, November, 1894.

In December, 1894, this child was brought to me: a bright, exceedingly intelligent, very pretty girl, less thin about the face than elsewhere, and sufficiently developed for her time of life. There was marked general emaciation, which was most marked in the right arm; the weight at this time was about sixty pounds. There was great contraction of the legs upon the thighs, so that the heels lay up against the buttocks, and the feet were crossed, one ankle over the other. The contraction of the thighs upon the pelvis was not much beyond a right-angle. The knees were closely drawn together. It was impossible forcibly to straighten the legs, even after complete use of chloroform, and the joints were secondarily affected, the knees partially luxated. The skin of the limbs about the ankles and knees was thickened, shining, and smooth, and in the cracks of the joints, as behind the knee, was excessively hard and tough, as though there was infiltration of the areolar tissues, it being difficult to feel the tendons distinctly. The temperature of the legs was good above the knees, but the feet were exceedingly cold, although there was nothing remarkable about the nutrition of the nails, either in the feet or hands. The cutaneous, muscular, and tendinous reflexes were all absent, and pins could be stuck in anywhere below the hips without evidence of pain. Neither was there any thermal sense below the groin or in the right arm.

Over and above the contraction in the muscle there appeared to be also a true paralysis of motion below the knee, as the child was incapable of making the slightest exhibition of movement of the toes or ankles. She could lift and hold both arms up from the bed. She could not grasp anything with either hand, but with a little management and support could hold a book. There was no very complete loss of power in the upper limbs to localize a touch or to detect extremes of heat and cold. Pain was here unfelt, and there was analgesia over the whole trunk. The biceps tendon-jerk and the muscle-jerk of the extensors of the hand were, however, present. Respiration was normal, about eighteen to the minute; the heart, lungs, and bowels were natural; there was no evidence of

organic disease in the abdomen or elsewhere; the urine was normal. The sight was good at this time;

FIG. 5.



With pen in right hand, guided by left hand, March, 1895.

the pupils were equal, moderately dilated, and reacted well to light and in accommodation.

more difficulty, explaining that it was on account of the moustache which hides the lip.

Dr. Archibald G. Thomson examined the eyes and ears, and reported as follows: O. D. The media are clear; the pupil clear and reacting normally. The disc is normal and color good, with a small central cup. The vessels and the fundus are normal, 4–1, with astigmatism. The fields for form and color are normal. O. S. The same as the right, except that the astigmatism is a little higher. The muscular balance is slight. Exophoria due to weakness of internal rectus. There is no perforation of the tympanic membrane or other gross lesion of the ears.

This child remained at rest in bed on her side always. To be on the back caused lumbar ache. Before attempting any more serious step I endeavored to see how much movement I could get in the legs by the continuous use of massage and faradic electricity. Very soon I found that there was a slight increase of sensation everywhere; that the limbs were beginning again to grow; that they could be drawn down each day a little lower, and

FIG. 6.

E. M. H.: Attitude before treatment.

FIG. 7.

E. M. H.: Attitude after fifteen days' treatment.

The child declared that she was absolutely deaf, and made no attempt to speak whatsoever. She read her mother's lips with ease, and mine with

that the temperature of the feet increased. After a few weeks of this treatment we ceased to gain any further power of passive extension of the limbs, and

it became obvious to me that, however reluctantly, I must resort to surgical interference.

Meanwhile her deafness interested me greatly. It became rapidly well in a few weeks. Speech came back with nearly as great speed, so that within two months after she fell into my hands she could speak perfectly well, could hear entirely well, could see as well as ever, and was recovering pretty rapidly the use of the left arm and more slowly the right. She had made also great gain in motion and sensation in the lower limbs above the ankles.

At this time I requested Dr. Keen to make sections of the tendons of the leg, one at a time, and this was done with great difficulty under profound etherization; partial straightening of the leg was accomplished then, with weights and apparatus, but not with the ratchet. There has been a gradual extension of the left leg, and it seems likely that it will continue to improve, although the previous history prepared me to see at any time some return of hysterical phenomena.

On April 26, 1895, the left leg was so much better that Dr. Keen thought it would be well to operate on the right leg. Sections of the tendons at the knee were made, but it was found that the head of the tibia was so luxated posteriorly as to render impossible such extension as had been effected on the opposite side. After a time a suitable apparatus may overcome this unfortunate mechanical difficulty, but much will depend on her endurance, and the gain to be hoped for from massage and electric stimulation.

Of the drawings, Fig. 6 represents the attitude of the child when she first came under my care; Fig. 7 the results obtained by massage and electricity and slight extension by weights, up to the date of operation; and Fig. 1 the position in which she placed herself when using her pencil or pen with her mouth. I also add *fac-similes* of parts of letters, written with her hands and with the mouth. (Figs. 2, 3, 4, 5.)

As a clinical lesson in hysteria, nothing could be more instructive than this record. I have little doubt that early isolation and resolute treatment would have saved these years of distress. Before we pass on to consider the gravest system—the general contractures—I desire to call your attention to the fact of the absence of changes in the fields for color and form—surely an amazing thing in a case with so much anesthesia. Unlike the case first spoken of, the wasted leg-muscles, especially the flexors, can be stimulated by faradic currents; but the current that moves them so slightly is one that I cannot endure, and that painfully cramps any of my muscles on which I test it. Electro-muscular sensibility and irritability are very much lower. Those muscles of the limbs that are made tense by long contraction of their opponents scarcely stir at all with the utmost power of a battery, but when I relax them somewhat by forcible extension of the limb the relaxed extensors move better under faradic excitation. This corresponds with the curious observations reported long ago by Morris J. Lewis and myself to the effect that forcibly stretched muscles not only move badly under electricity, but also do not feel it so keenly. Had not these muscles been once shortened by tendon-section and their sequent elongation I should have begun by cutting them. I felt that again to cut these tendons would result in further additions to their lengths and that I should run great risk of seriously disabling their strength. Nevertheless I shall be forced, soon or late, to take this risk. In a long experience with hysterical contracture I have never before come face to face with this difficulty. Of course, there is always the after-resource of shortening the tendons.

Seeing how great is the power with which the muscle in a state of spasm contracts, I used to fear that its retraction after surgical section of tendons would be excessive. It is not so. Rather does the sudden cessation of tension appear to put the muscle at rest, as though the resistance were one of the means of keeping up the pull made by the muscle. I have, in fact, lost the fear I once had as to section of hysterical muscles or their tendons.

In the case of Miss C.,[1] of which I have already spoken, there was extreme pain in the feet. In another case, to be presently described, there was a like torment. In the one just now related there has been little or none. The reason is, I think, this: While the flexion at the knee is in this latter extreme, that of the thigh on the trunk is not. In Miss C.'s case not only were the knee-joints at the utmost angle of acuteness possible, but the knees touched the chin, as was nearly the case in the man in Scott Ward, of whom I shall have more to say by-and-by. Now flexion at the knee only relaxes the sciatic nerve, but extreme flexion of the thigh on the trunk keeps the nerve tightly drawn over the edge of the notch, and may well be—indeed was, I am sure—the chief cause of pain in two of the cases referred to. In both, tendon-section and even partial extension of the limb speedily put an end to the pain in question. In my last case, the absence of pain is, I think, due to the lack of extreme flexion of the thigh on the trunk.

There are other interesting features in this case with which I can deal but lightly. One was the rare symptom, deafness. It was complete; nor did the most unexpected and violent sounds enable me to detect the patient in simulation. With Malony's ear-tubes she began to hear a little, and with her general gain the deafness speedily departed. I should not, above all, forget to say that for the first time in her history she was isolated from her relatives.

(To be concluded.)

[1] Lectures on Nervous Diseases, p. 227.

THE PUPIL IN HEALTH AND IN EPILEPSY.

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PUPILLARY inequality, technically termed anisocoria, is a sign that has been little studied in the healthy subject. In treating of pathologic conditions frequent reference is made to it, but as to its frequency in health, facilitating comparative study, there is practically nothing said of it in the text-books, and but few pages devoted to it in the literature. A comprehensive treatment of the "Pupillary Reaction" by Haddaeus[1] and a second paper by Iwanow[2] comprise the main contributions to this topic in the last ten years.

The matter of inequality of the pupils in its relation to epilepsy has in recent years been brought forward by several observers. In the *Journal of Nervous and Mental Disease* for 1893 Browning, of Brooklyn, discusses at some length the frequency of anisocoria in the interparoxysmal periods of epilepsy, and refers to the existence of this sign in its latent form. This, I believe, is the first mention of "latent pupillary inequality."[3] In opening the subject this writer states that "the condition of pupillary inequality is not very rare, even in persons of average health; that no great importance attaches to it in any class of troubles, but as an objective sign it is worthy of further study." After recording statistics he observes further: "As to the proportion of anisocoria in non-epileptics, or as to what proportion of the above cases may be due to local anomalies of the eye itself, we have no figures for comparison."

It will be the purpose of this paper first to direct attention to the percentage of anisocoria—manifest and latent—occurring in persons of average health, and then to consider pupillary inequality as seen by myself among a number of epileptics at the State Hospital for the Insane at Norristown, Pa., during my residence as interne at that institution.

Of anisocoria in health there is little to be found anywhere, as I have said. De Schweinitz[4] makes mention of it only in a foot-note, in which he briefly records the finding of Iwanow.[5] The latter investigator made his observations on 134 healthy young recruits, and found an equal width of pupil in but 12 of them. The right pupil was larger in 49, the left in 73. The face was asymmetric in 131, the left half being larger in 99, the right half in 32. Iwanow believes that "an unequal width of pupil does not always have a pathologic significance."

Fuchs,[1] after explaining the consensual reaction to light and the connection existing between the oculomotor nuclei of both sides, producing simultaneity of action, concludes that "inequality of the pupils is always pathologic." To my mind, having myself found in 50 selected healthy cases slight unequal width of pupils 7 times, it seems safe to assume that our Viennese author refers to an inequality both manifest and gross.

From my case-records I have tabulated the pupillary conditions in 50 cases presenting vision of $\frac{6}{6}$ or better, most of which applied for relief from slight refractive anomalies. The list includes both sexes. It embraces work that antedates my interest in latent anisocoria, and will serve therefore only in studying manifest pupillary conditions. The dimensions noted in each of the records mentioned have reference to the condition of the iris when unaffected by the associated acts of convergence and accommodation, as it is my practice when observing the pupil to have the patient survey a distant object. In this series of cases taken from both sexes there were found five anisocorics, a proportion of 10 per cent.

During last summer, through the kindness of the United States recruiting officer at this point (Pottsville), it was my privilege to examine the eyes of a great number of applicants for enlistment in the army. From these I have tabulated 50 cases, with the view of ascertaining the percentage of anisocoria—both varieties—existing in healthy subjects. By examining males only any conflicting findings that might be the result of special feminine characteristics were avoided. All of these applicants were fine examples of physical manhood and well-being, presented normal eyes, and had vision of $\frac{6}{6}$ or better. The following course was pursued in each case:

1. Subjects were chosen whose eyes were free from tissue-changes in all the media and tunics.

2. The complicating influence of convergence and accommodation was excluded by proper measures.

3. The observation for manifest pupillary inequality was conducted under full indirect solar illumination (diffuse daylight).

4. That for latent anisocoria was made with illumination from the ophthalmoscopic mirror as in ordinary ophthalmoscopy, using a three-fifths-inch flame on an argand burner, this amount of light at a distance of one foot being just sufficient to carry on examination in a well-darkened room.[2]

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[1] Haddaeus: Berliner klinische Wochenschrift, 1886, Nos. 17 and 18.

[2] Iwanow: Arch. of Ophthal., vol. xvi, p. 464. On the reaction of the healthy pupil.

[3] Manifest inequality refers to the occurrence of unequal pupillary areas under full monocular exposure to diffuse daylight.

Latent inequality occurs when the pupils are equal under full monocular exposure to diffuse daylight, but differ in size when in a passive condition in a darkened room, the pupil being illuminated by a feeble light from the ophthalmoscopic mirror as in ordinary ophthalmoscopy.

[4] Text-book, p. 264.

[5] Op. cit.

[1] Text-book, p. 261.

[2] It was understood that even more exact results, had it been desired, could have been obtained by estimating each time the

In this way a minimum illumination of constant intensity is obtained. In a darkened room, with the patient's back to the light, the pupil dilates two-thirds, averaging 6 mm. The first impact of the light from the ophthalmoscopic mirror on the retina sets up primary iridic contraction, but after a few oscillations the pupil remains at about 6 mm. By throwing in the light from either side of the eye the minimum retinal stimulus is produced, and the resultant oculomotor reflex held as nearly as possible in abeyance, thus revealing the slightest discrepancies in size. Therefore peripheral retinal stimulation only was employed in estimating the latent pupillary condition.

5. In examining for either manifest or latent conditions monocular exposure was used in the determination.

6. Owing to the difficulty of observation under feeble illumination differences in the pupil of less than ½ mm. were not considered.[1]

1. The same routine examination was adhered to in each case, thus obviating the possibility of different results arising from different methods of study. Care was also taken that each examination was made under the same conditions.

A study of the table growing out of this second series of cases shows that under full exposure to diffuse daylight anisocoria was present in 7 of the 50 cases—14 per cent. Under feeble artificial illumination it was observed in 20 of the 50 cases. Of these 20, 4 exhibited inequality under both strong and feeble illumination, and therefore fall out of the count in considering latent anisocoria. This leaves 16 cases (32 per cent.) presenting demonstrable latent inequality. In explanation of this large proportion of pupillary inequality under feeble light-stimulus, it should be observed that the measurements were exact and the differences slight; in 16 cases the difference between the pupils was ½ mm., in 2 cases 1 mm., and in 2 cases 1½ mm. In this latter series the average diameter of the pupil in diffuse daylight was found to be 3 mm., while under ophthalmoscopic illumination it was 6 mm. The average excursion of the iris was therefore 3 mm.

Taking the statistics of this series, in conjunction with those of the previous one, we find in 100 subjects, free from disease, inequality of the pupils in 24 (24 per cent.).

In passing to the consideration of this pupillary sign as related to the epileptic interval, it would be well for purposes of comparison to note the findings of others. Schleich, Marie, and Oliver conducted their studies on institution-inmates. The first-named observer found the condition in but 4 per cent. of his cases, while Marie and Oliver show a frequency of 15 per cent. Musso records 22 per cent. in 70 cases, and Addison 4 per cent. in 50 cases. This wide diversity in statistics must find its explanation, as Browning has it, "in varying closeness and time of observation." Browning's study of 150 consecutive dispensary-patients at the Long Island Hospital revealed 16 cases. Of this 16, 3 exhibited Jacksonian, secondary eclampsic, and tabetic symptoms.

In my work at the Norristown Asylum I had occasion to study 22 selected cases of epilepsy. Among these were 4 which, though of traumatic origin, manifested no Jacksonian symptoms; in fact, the whole symptom-complex was that of non-focal epilepsy. The precautions as to exclusion of improper cases and adherence to a routine method of examination under the same conditions, as noted in connection with the work on healthy individuals, were rigidly observed in this last study, in the hope that the findings might approach as nearly as possible to absolute accuracy. Additional care was taken in this series that each case be examined in the interparoxysmal period.[1]

Analysis of the resultant table shows that in 22 cases of epilepsy, anisocoria of some degree was present in diffuse daylight 5 times, or in a proportion of 22⅞ per cent.

Let us now group the findings:[2]

Observer.	No. of cases examined.	No. of times anisocoria found.
Marie	53	8
Musso	70	16
Oliver	50	7
Browning	150	16
Reber	22	5
	345	52

Thus, in 345 observations made by different investigators, anisocoria was found in the proportion of 14½ per cent. The foregoing figures agree pretty well, and it seems safe to assume that 1 epileptic in 7 will present some manifest pupillary inequality.

So much for the general opinion as to the frequency of manifest inequality. As to latent inequality in epilepsy, there are few figures for comparison, Browning's being the only ones I have been able to find. This observer points out the varying and deceptive influence of light and shadow in making estimations, and recommends trying the light from both sides before deciding, using a dim,

photometric equivalent of the flame in the argand burner, but it was felt that for purposes of scientific accuracy the method adopted was adequate.

[1] The measurement of the pupils was made with a pupillometer marked in half-millimeters, careful account of the corneal aberration being taken.

[1] No patient was examined within twenty-four hours of a seizure.

[2] Addison and Schleich not included. It is felt that they recorded only gross differences in the pupils.

diffuse daylight. He states that "even with this precaution it remains a relative matter so far as estimating the degree of illumination is concerned." He found 2 instances of the latent phenomenon in the last 50 of the 150 cases he examined, though he remarks that, had the condition been carefully sought for in his previous 100 cases, the proportion might have been increased.

The method of studying the passive or latent condition of the pupil in healthy subjects, noted in the second series, was rigidly adhered to in studying this phase of the pupil in epilepsy. All the precautions there thrown out were here observed, and, as in my preceding study of epileptics (of the manifest condition), examinations were made only in the intervals between seizures. In this manner inequality of the pupils was found 8 times in the 22 epileptics. Of the 8 affected cases, 2 presented unequal pupils in diffuse daylight, and cannot therefore figure in the calculation. There remain 6 cases of undoubted latent pupillary inequality in a total of 22 examined. It must be remembered that all of the 22 were asylum-cases that had been committed to the institution because of the chronicity of their affection. Of the 6 cases presenting latent anisocoria, 1 was twenty-one years of age, 1 was thirty-five years, and the remaining 4 ranged from 40 to 50 years. Hence it would appear that latent inequality appears dominantly among old epileptics in whom degenerative changes have been wrought; in whom frequently repeated functional disturbances have finally produced structural changes, and physiology has passed over into pathology. It seems also probable that the proportion of latent anisocoria here found (27⅓ per cent., or 6 in 22) represents its highest frequency, inasmuch as the terminal degenerations found in institution-inmates are favorable to the occurrence of the phenomenon.

For comparative study I shall contrast the different series.

1. *Comparing manifest and latent anisocoria in health.*

In 100 healthy subjects (my own cases) inequality of the pupils was found in diffuse daylight 24 times (24 per cent.).

In 50 healthy selected cases (all young army-recruits examined by me) the pupils under feeble artificial illumination (latent anisocoria) were found unequal 16 times (32 per cent.).

2. *Comparing manifest anisocoria in health and epilepsy.*

In 345 epileptics (examined by various observers) inequality of the pupils was found in diffuse daylight 49 times (14⅙ per cent.).

In 100 healthy subjects (my own cases) inequality of the pupils was found in diffuse daylight 24 times (24 per cent.).

3. *Comparing latent anisocoria in health and in epilepsy.*

In 22 epileptics (my own cases) the pupils were found unequal under feeble artificial illumination 6 times (27⅓ per cent.).

In 50 selected healthy cases (all young army-recruits examined by me) the pupils were found unequal 16 times (32 per cent.).

4. *Comparing, lastly, manifest and latent anisocoria in epilepsy.*

In 345 epileptics (examined by various observers) manifest anisocoria was present 49 times (14⅙ per cent.).

In 22 epileptics (examined by me) latent anisocoria was present 6 times (27⅓ per cent.).

In Comparison No. 1 we find just what would be anticipated, namely, that when the oculomotor control of the pupil is removed, even in health, pupillary inequality reveals itself more frequently.

A first glance at Comparison No. 2 would seem to indicate that manifest anisocoria is more prevalent in health than in epilepsy. It is my impression, however, that, had the same searching scrutiny been exercised in the epileptics that was bestowed upon the healthy subjects, the proportion would have been found about equal.

Similarly in Comparison No. 3, in which the greater proportion of latent anisocoria would seem to obtain in health, it is my belief that, had I employed the same accuracy in my study of the epileptics (who were examined first) that was afterward observed in the study of the selected healthy cases, the proportion here would have been about equal.

In Comparison No. 4 we again find latent anisocoria the more frequent, and also, as would be expected, the relative frequency of latent inequality is much greater in epilepsy than in health. As the passive condition of the pupil is dominated by the sympathetic nervous system, we would naturally find oftener in epilepsy, in which the equilibrium of the sympathetic nervous system is unstable, an inequality in the pupils. The phenomenon accords very well with Browning's conception that "whilst the passive (*i. e.*, sympathetic) innervation of the irides is in such cases unequal or disproportionate, the reflex impulse—equal for the two eyes—is, when fully called into play, quantitatively so far in excess as to overbear completely all passive ones, and so for the time being to wholly dictate the pupillary condition. The relative superiority of the oculomotor control of the pupil, as compared with the sympathetic, is, of course, a matter of every-day observation. This explanation interprets the morbid phenomenon as a symptom resulting not simply from bilaterally uneven sympathetic action, but as one that only appears at times when the action of the oculomotor is relatively or absolutely in abeyance."

Hence we distinguish

1. A passive or latent anisocoria.

2. An active or manifest anisocoria.

The origin of active or manifest anisocoria must be considered in its relation to the oculomotor nuclei situated in the fourth ventricle. However, it would be foreign to the purpose of this paper more than to mention this point. It will be more fully considered in a future paper.[1]

From my studies I incline to the belief that the frequency of manifest pupillary inequality in epilepsy is nearer 20 than 15 per cent., and that when investigators have failed to show that amount their work has been lacking in closeness of observation. I further believe that about one epileptic in four will exhibit some latent pupillary inequality.

While I realize that my work is open to the criticism of insufficiency of data, I feel justified in drawing the following tentative conclusions:

1. That pupillary inequality, even of considerable degree, is not always pathologic.

2. That in order to demonstrate latent inequalities the oculomotor influence must be as nearly as possible set aside.

3. That in health latent inequality is more frequent than the manifest form, in the proportion of 4 to 3.

4. That in epilepsy the latent form of the anomaly is more frequent than the manifest in the proportion of 2 to 1.

5. That it is only of relative importance in epilepsy, and can occupy but a minor position in building up the objective picture of that disorder.

RECENT MEASURES FOR THE PREVENTION AND TREATMENT OF TUBERCULOSIS.[2]

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A BRIEF review of the extensive provisions for tuberculous patients abroad shows how far behind America is in the systematic care of this large class of sufferers. I do not, of course, refer to provision for those who are able to command, in addition to skilled medical attendants, the measures that promote recovery, and especially the advantages of favorable climates; but rather the hospital-class, of far greater extent, who need the housing, food, and care that they are unable to purchase. The well-to-do are at least as well provided for here as in Europe; but our State governments have not, to any appreciable extent, definitely helped the dependent class in this regard. The English began to look after the tuberculous more than a hundred years ago. An institution for their relief was established in Kent as early as 1791. The Hospital for Consumptives and Diseases of the Chest at Brompton, which was established fifty-four years ago, now has a capacity of 315 beds and an income of over one-hundred-thousand dollars. Other hospitals have been erected at Torquay, Bournemouth, and Liverpool; and in 1869 the Royal National Hospital for Consumption and Diseases of the Chest, at Ventnor, Undercliff, Isle of Wight. The last includes twenty buildings picturesquely situated, and has a capacity of 134 patients. Altogether, England has eighteen institutions of this character, which receive annually between 6000 and 7000 patients.

France has institutions at Berck-sur-Mer, Arcachon, Cannes, Argeles, founded in 1878, Touraine at Ormesson, and Villiers on the river Marne and Villepinte. The city of Paris has also erected a large sanitarium for indigent tuberculous persons at Agincourt, with a present capacity of 100, and provision for enlargement.

Germany has an institution for the tuberculous at Falkenstein in the Taunus, near Frankfort, under the care of Dr. Dettweiler. One at Ruppertshain, in the same neighborhood, is being erected for the accommodation of seventy-five. In 1893 an institution was opened at Rehburg, in Hanover, for the tuberculous poor of Bremen; it has provision for twenty-four beds. In the first ten months sixty-nine patients were admitted and about one-third were able to return to their occupations.

At Malchow, near Berlin, an institution was established in 1892 for men in any stage of tuberculosis. It has a capacity of 100, and cost $50,000. At Gütergotz, also near Berlin, a similar institution for eighty patients is projected; another, to cost 250,000 marks, is to be erected at Reiboldsgrün, at an elevation of 2160 feet, where there is already a small institution for persons of means. The city of Worms is also adopting similar measures for its tuberculous; so also in Würzburg plans are being formed to erect a sanitarium at Spessart. At St. Andreasburg and Blankenhain in the Hartz Mountains, and at St. Blasien in the Black Forest, successful institutions are conducted.

At Vienna Prof. Schrötter has made great efforts to have an institution established, and, with very liberal help on the part of Baron Rothschild, who has offered lands and money, his plans will be carried out. At Munich, Lübeck, Hanover, and Stettin similar institutions are being planned.

Much of the encouragement toward action on the part of municipalities has come from the remark-

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[1] In the report of a case of "unilateral absolute iridoplegia," soon to be published, it will be necessary to review the different theories concerning the manner of the origin of the roots of the oculomotor nerve.

[2] Read at the meeting of the American Climatological Association, held at Hot Springs, Va., June 13, 1895.

able success in the treatment of tuberculosis that has been obtained in private hospitals. Brehmer, who established his sanitarium at Görbersdorf, in Silesia, in 1854, reported after the first fifteen years that twenty per cent. of his 958 tuberculous patients had been permanently cured. Charles Theodore Williams recently stated that of 247 patients, chiefly in the early stages of the disease, who had been sent to his private Alpine Sanitaria, chiefly Davos, St. Moritz, and Arosa, "a cure was effected in 101, or 40.89 per cent.; great improvement in 73, or 29.55 per cent."

Dr. Trudeau in the last annual report of the Adirondack Cottage Sanitarium, which has just completed its tenth year of existence, states that from 20 to 25 per cent. of the patients have been apparently cured after a prolonged residence; cases in which the rational signs of pulmonary tuberculosis and the bacilli in the expectoration have been absent for three months or more, or in which there is no expectoration at all; any abnormal physical signs remaining being interpreted as indicative of a healed lesion. This, I may say, is still the only institution in this country that is strictly built on the cottage-plan. Two new buildings have been erected during the past year. The sanitarium has now twenty-two buildings, with accommodations for eighty-four patients. It has a free-bed fund of $14,000, through which it gives aid to the very poor, and an additional $25,000 has been put aside toward a permanent endowment-fund.

The new sanitarium at Paul Smith's in the Adirondacks, at an elevation of 1800 feet, is nearly ready for the reception of patients. This institution is called the Sanitarium Gabriels, and will accommodate fifty persons. It will be under the care of the Sisters of Mercy of the Roman Catholic Diocese of Ogdensburg, but is intended to be non-sectarian as regards the admission of patients. Dr. W. Seward Webb and Paul Smith have given 100 acres of land for a site. An infirmary, an administration-building, and a half-dozen cottages are included in the plans. The first will be a handsome structure, two stories in height and built of wood and stone, with a glass-enclosed solarium and arrangements for the open-air method of treatment. A nominal charge will be made for treatment.

A recent movement in New York City to erect a memorial to the late Dr. Alfred L. Loomis, a former President of the American Climatological Association, has met with a liberal response. Already one gentleman has contributed sixty-five thousand dollars toward the proposed sanitarium for tuberculous persons now being erected at Liberty, Sullivan County, New York, in memory of our lamented friend. The plan includes a central building, with a number of surrounding cottages; two of these at a cost of from three-thousand to five-thousand dollars apiece are being constructed. The elevation is two-thousand feet, and is reached by rail in five hours from New York City.

New York has also a large institution, the Seton Hospital, for tuberculous patients, at Spuyten Duyvil, near the Harlem River. It has accommodations for three-hundred. The State of Massachusetts has recently appropriated $150,000 for a similar institution. Colorado has two such institutions: the Glockner Sanitarium, with a capacity of forty, and the Bellevue Sanitarium, with a capacity of twenty-five. The latter, however, is not open at present through lack of funds for maintenance.

The Pennsylvania Society for the Prevention of Tuberculosis was organized April 10, 1892. Its object is the prevention of tuberculosis, first, by promulgating the doctrine of the contagiousness of the disease; second, by instructing the public in the practical methods of avoidance and prevention; third, by visiting the tuberculous poor and supplying them with the necessary materials for protecting themselves against the disease, and instructing them in their use; fourth, by furnishing the tuberculous poor with hospital-treatment; fifth, by co-operating with Boards of Health in such measures as they may adopt for the prevention of the disease, etc.; sixth, by advocating the enactment of appropriate laws for the prevention of the disease. Efforts have been made by the Society to have tuberculosis placed upon the list of diseases returnable to the Philadelphia Board of Health, and to empower the Board to disinfect houses in which deaths from this disease have occurred. Such measures have been carried out in New York City for the past six months with success, and are now to be carried out in the city of Buffalo, N. Y., where the Department of Health is adopting energetic measures toward the prevention of tuberculosis. Since June 15, 1895, all cases of tuberculosis occurring in the practice of any physician in the city must be reported to the department. On receipt of such notice a circular of information will be sent to the families and those in charge of the patient, giving strict rules as to sanitation, etc. Recognizing that the consumption of meat and milk from tuberculous animals is one of the frequent sources and modes of tuberculous infection of the human being, especially of bottle-fed infants and children of tender age, the Society resolved to urge upon the Legislature of Pennsylvania the necessity of the early enactment of laws to secure the exclusion of the meat and milk of tuberculous animals from this Commonwealth. Under these laws about 500 living cattle and a large number of fresh carcasses have been condemned as unfit for the dairy and the market.

Commencing with June 1, 1895, a new law, estab-

lishing a State Live-stock Sanitary Board, went into effect. This Board is composed of the Governor, the Secretary of Agriculture, a Dairy and Food Commissioner, and the State Veterinarian. To administer this law an appropriation of $50,000 will be at the disposal of the Live-stock Sanitary Board during the next two years, for dealing with the various contagious and infectious diseases, and for the first time in the history of Pennsylvania there will be a conservative and systematic plan of dealing with these diseases.

It is interesting to note in this connection that the Royal Commission on Tuberculosis reported in April, 1895, to the British government the conclusions of its important investigations, namely, that it is satisfied that the cause of an appreciable part of tuberculosis in man is conveyed through his food—*i. e.*, the meat of tuberculous cattle. The Commissioners believe that the danger lies not only in diseased organs unremoved in the dressing, but also in conveying to healthy parts tuberculous matter by means of the knives and clothes used by the butchers in dressing.

The Society for the Prevention of Tuberculosis has widely distributed its tracts, namely, 50,000 of tract No. 1, entitled "How to Avoid Contracting Tuberculosis;" and 40,000 of the other, entitled "How Persons Suffering from Tuberculosis Can Avoid Giving the Disease to Others." A great interest has been taken in the Society by physicians in all parts of the world. Boards of Health in almost every State in the Union have made application for these tracts, and have been supplied. Within a few weeks a request from Boston for 500 tracts was received, and very gladly complied with. Physicians in all parts of the South and West, in various portions of Canada, and even so far as the Hawaiian Islands, have made application for them.

Vigorous efforts were made during the past winter to secure the establishment in Philadelphia of a Municipal Hospital for the tuberculous poor. A committee of the Society also visited Harrisburg to urge the necessary State legislation to establish a State Sanitarium for tuberculous persons, to be located at a favorable elevation in the mountainous portion of the State. As a result of this visit the State Board of Public Charities of Pennsylvania recommended to the Legislature an appropriation of $50,000 to carry out the provisions of the bill. While these measures have not yet been successful, there is good reason to believe that the State will take the matter up as soon as some other important charitable measures, as, for instance, the new school for feeble-minded children in Western Pennsylvania and the new hospital for the epileptic insane, are accomplished.

The Society meets annually on the first Friday in May. Any person who pays one dollar or more into the treasury of the Society will be enrolled as a member for the year in which such payment is made. The by-laws provide that all money in the treasury, beyond that which is necessary for defraying the general expenses until the next meeting of the Board, shall be set aside for the use of a Hospital Fund. When the money in the Hospital Fund shall amount to $150 or more a tuberculosis patient shall be placed in a hospital for every $150 in the Fund.

There is no doubting that, as a result of the influence of this Society, of the American Climatological Association and of kindred organizations, and the issuing of so many thousands of tracts disseminating the principles of the communicability of tuberculosis and the best means of preventing it, the people of the United States are beginning to take very much more interest in the tuberculous patient personally, and that they see the necessity of organized effort to lower the mortality and eventually stamp out the disease. The city of Philadelphia, at least, is showing a marked response to the efforts made to lower the death-rate from tuberculosis. In this city, notwithstanding its growth in population, the actual number of deaths from pulmonary tuberculosis has gradually diminished since 1880. There were in each 100,000 of population 342 deaths from this cause in 1870, 317 in 1880, 264 in 1890, and only 220 in 1894.

We cannot tell in the State of Pennsylvania just how the mortality is tending, owing to our deficient system of registration; but we know that in Philadelphia there are about 6000 sick with tuberculosis, and in the State at large about 20,000 have the disease. In New York State the ratio of deaths from tuberculosis to the total deaths has steadily fallen since 1890. These facts are significant of the change that has come over the profession in the manner of looking at the disease and of treating it, and also of the attitude of the public itself, which is rousing from its long indifference. The people need plain teaching on this point, for most of them cling to the traditional idea that tuberculosis is strictly an hereditary disease, and consequently unpreventable. The large majority of people do not yet believe that it is contagious, and although, when requested, some persons may observe some of the sanitary precautions we advise, they do it often in a perfunctory manner. The other members of the family, who frequently take little account of the idea of the contagiousness of tuberculosis, do not co-operate in carrying out these measures. Greater efforts must therefore be made to reach the people.

More societies for the prevention of tuberculosis should be organized. We need to organize and maintain special hospitals and cottage sanitaria for tuberculosis. The first step is to find out the localities where medical measures will receive the greatest

aid from natural resources, from air and altitude and sunlight. The patient who is weakened in body, deprived of his usual means of livelihood, face to face with a long illness, with little to supply for himself or his family the necessaries of life, not to speak of other needs relating to his disease, needs special help, and it is no wonder that little can be done in our cities to stay the course of this disease. The best solution of the problem, I believe, will be to take these afflicted beings out of cities to brighter skies and evergreen forests, where Nature and art, hand in hand, may work together for their good, and, it may be, for their final cure.

CLINICAL MEMORANDUM.

INVERSION OF THE UTERUS.

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THE report of a case of inversion of the uterus by Crouse, in THE MEDICAL NEWS, June 8, 1895, suggests to my mind a case that came under my observation in March, 1894. The patient, aged seventy-two years, a German, was brought to the Buffalo General Hospital. The ambulance-surgeon reported that he had found the woman in a most deplorable and filthy condition, in a small, ill-kept cottage, where she had lived a secluded life for fourteen years. The neighbors said that she would only make her appearance at long intervals, when forced to go out for provisions. She was a widow, with grown and married children, the youngest forty-one years old, and who were unable to live with her, owing to her eccentricities.

Upon entrance it was observed that the woman was evidently demented; she could not give a clear history of herself and not even of recent occurrences. In giving her her initial bath the nurse discovered a large tumor protruding from the vaginal outlet. My attention was called to the fact and a careful examination was made. I found a tumor the size of a large cocoanut in the position stated. It was covered with thick, dirty crusts or scabs, showing evidence of former ulceration and Nature's effort at healing, and presented a few circumscribed ulcerating areas varying in size from a dime to a silver quarter-dollar. The last were moist, sloughing, and foul-smelling, showing the very worst evidence of gross neglect. The remainder of the surface was covered with dry scales. Surrounding the circumference of this tumor was a thickened, pigmented ring, which appeared to be the former site of the cervix. Upon advice of Drs. Hopkins and Cary I anesthetized the patient, and after thoroughly cleansing the surface formed the fingers and thumb of my left hand into a cone and applied them to the most dependent part (the fundus), with the right hand in the suprapubic region. The parts were now entirely relaxed, and by careful manipulation the tumor was restored to the interior of the abdomen. Then the condition was found to have been one of complete inversion of the uterus and vagina. When replaced to their normal position the parts were so relaxed and so roomy that, with my fist clenched *in utero*, my whole forearm within an inch or two of the elbow was within the vulval opening. A most peculiar sensation was conveyed to my hand by the dry, wrinkled endometrium, which had for so long a time been the much-stretched external covering of the tumor. The hand was gradually withdrawn and large tampons were packed within the uterine cavity, to give to it bulkiness and to prevent its coming down again. Gradually these tampons were removed, and the uterus never again made its appearance externally during her three weeks' stay at the hospital. During the last week or ten days of this period the patient sat up and walked about the ward.

A few features of the case are interesting:

First, the perverted mental condition markedly present upon the woman's entrance entirely cleared up, and when discharged she conversed freely in her native tongue, showing no evidence of any perversion; but she could never give a clear history of her health for a few years prior to her coming to the hospital.

Second, a most interesting point was that on the second day following the restoration of the uterus the woman began to pass vesical calculi, and for two days afterward she passed in all twenty-four, varying in shape and ranging in size from a small split pea to a large white bean; many were facetted. They were made up of uric acid with a phosphatic crust. These were in all probability formed in the sacculated portion of the bladder caused by the dragging down of the soft parts, this sacculation becoming more or less obliterated when the tumor was replaced.

Third, it would seem hardly credible that with the amount of stretching and relaxation of the soft parts operative interference in the way of shortening ligaments was not called for, and that simple tamponade was sufficient.

MEDICAL PROGRESS.

Acute Nephritis due to Eczema.—BRUHNS (*Berliner klinische Wochenschrift*, 1895, No. 28, p. 606) has reported seven cases of eczema, presenting also acute nephritis, in six of which it is believed that this developed with certainty as a sequela, while in the remaining one there was some doubt. In three of the cases no treatment to which could be ascribed the renal lesion had been employed prior to the onset of the albuminuria. In the fourth case diachylon-ointment had been employed, but this could with certainty be excluded as a cause of the nephritis, as no other symptoms of lead-intoxication were present and the amount used was inconsiderable; besides the renal symptoms only appeared four weeks after the beginning of the treatment. In the fifth case a tarry ointment and in the sixth case one containing styrax were used, and it is unlikely that either of these would be responsible for the nephritis. In the sixth case styrax was at first used and later balsam of Peru. In the seventh case a nephritis in the process of recovery was found, and this is included among the number on account of its similarity to the other cases.

Cerebro-spinal Meningitis in an Infant Six Days Old.—ROTCH (*Archives of Pediatrics*, vol. xii, No. 8, p. 585) has reported the case of an infant, weighing 8¼ pounds at birth, and apparently healthy until the sixth day,

when it refused to nurse and vomited the little that it took. It cried out when asleep and at times would awaken with a sudden start. The temperature was elevated. On the following two days the infant had in irregular succession convulsions to the number of fifty, in the intervals of which it seemed perfectly well. The contractions were clonic and general in character and death took place in one. Upon post-mortem examination the inner surface of the dura mater appeared covered with opaque yellowish patches, the lymph being specially marked over the base of the skull. The vessels of the pia were markedly injected, and the meshes of this membrane were filled with an opaque, greenish-yellow purulent exudation, extending over the entire brain and into the spinal canal. Microscopic examination disclosed the presence of pneumococci.

Inoculation of Tuberculosis through Tattooing.—COLLINGS (*British Medical Journal*, No. 1795, p. 1200) has reported three cases in which local tuberculosis developed as the result of tattooing by a tuberculous person, who used Indian-ink rubbed up with saliva in the palm of his hand. The tuberculosis was conveyed by a lad, fifteen years old, who subsequently died of advanced pulmonary tuberculosis. A short time before his death he tattooed two of his brothers, aged thirteen and ten years, respectively, and a friend, aged fifteen years. The arms at the site of inoculation presented pustules and scabs. In all three cases there was enlargement of the epicondylar and axillary glands. The general health of the boys did not suffer appreciably. The lesions were all seen by Mr. Jonathan Hutchinson, who expressed the opinion that they were due to the inoculation of tubercle. A piece of skin from the arm of one was examined and presented well-marked giant-cells in the corium, but tubercle-bacilli could not be demonstrated.

Return of the Tendon-reflexes in the Course of Locomotor Ataxia.—RAICHLINE (*Comptes Rendus Hebdomadaires des Séances de la Société de Biologie*, 1895, No. 23, p. 508) has reported a case of locomotor ataxia complicated by hemiplegia of cerebral origin, in which not only did secondary contractures develop, but also the tendon-reflexes returned. The deep reflexes of the upper extremity became exaggerated immediately after the onset of the hemiplegia, which involved the left side, was complete, and set in without prodromes, without loss of consciousness, and without involvement of speech. The patellar reflex upon the paralyzed side returned in the course of four months and became normal or nearly so. At the end of six months the tendon-reflexes had partially returned upon the unaffected side, notably those of the biceps, the triceps, and the supinator longus.

The Toxin and the Antitoxin of Cholera.—As the result of an experimental investigation, RANSOM (*Deutsche medicinische Wochenschrift*, 1895, No. 29, p. 457) has found that it is possible to obtain from cholera-cultures a fluid free from bacteria possessing specific toxic properties. The clinical manifestations induced by this fluid are similar to those resulting from the ingestion of living cholera-organisms. From this fluid it is possible to isolate a substance whose action is identical with that of the original fluid. Animals susceptible to cholera and treated with the cholera-toxin yield a serum that is antagonistic to the action of both the cholera-poison and the living cholera-organisms.

THERAPEUTIC NOTES.

The Treatment of Typhoid Fever with Cold Baths.—VOGL (*Blätter für klin. Hydrotherapie*, Jahrg. v, No. 6; *Berliner klin. Wochenschr.*, 1895, No. 29, p. 643) gives the following statistics bearing upon the treatment of typhoid fever with cold baths, based upon recent experiences.

Jürgensen (Tübingen) with expectant treatment had a mortality of 22.1 per cent.; with partial bath-treatment a mortality of 7.1 per cent.; with methodic bath-treatment a mortality of 1.8 per cent. Brand (Stettin) with methodic bath-treatment had a mortality of 3.5 per cent. Ratjen (Hamburg) with methodic bath-treatment had a mortality of 4 per cent. Drasche (Vienna) with methodic bath-treatment had a mortality of 9.3 per cent.

From France, where the cold-bath treatment was only adopted late, the following figures were obtained: Tripier and Bouveret (Lyons), before the institution of the cold-bath treatment, had a mortality of 25 per cent. and afterward a mortality of 7.5 per cent. Richard, among 38 cases treated by expectancy and baths, had a mortality of 10.2 per cent., and among 38 cases treated methodically with the cold bath a mortality of 5.2 per cent. Juhel-Renoy found with expectant treatment a mortality of 14.2 per cent.; with methodic bath-treatment a mortality of 7.3 per cent. (collective investigation); and had with methodic bath-treatment a mortality of 4.7 per cent. (personal observation).

The following American figures are cited: Kellogg (Philadelphia) before institution of the bath-treatment a mortality of 17 per cent.; after institution of the bath-treatment a mortality of 4.5 per cent. Elliot (Philadelphia) before institution of the bath-treatment a mortality of 24 per cent.; after institution of the bath-treatment a mortality of 6.5 per cent. Osler (Baltimore) before institution of the bath-treatment a mortality of 21.8 per cent.; after institution of the bath-treatment a mortality of 7.4 per cent. Thompson (New York) before institution of the bath-treatment a mortality of 19 per cent.; after institution of the bath-treatment a mortality of 7 per cent.

In Munich, between the years 1841 and 1860, as the result of medicinal treatment, the mortality of typhoid fever was 21 per cent. From 1860 to 1875, with partly expectant and partly bath-treatment, the mortality was 15.2 per cent. From 1875 to 1881–82 with bath-treatment, partly combined, the mortality was 6.5 per cent.

In the Treatment of Alopecia Areata, SABOURAUD (*Corresp.-bl. f. Schw. Aerzte*, 1895, No. 15, p. 479) first applies a cantharidal plaster to the bald area. On the following morning the blister is incised, the epidermis removed, and the exposed corium painted with a solution of silver nitrate, 1 to 15. This method has been employed in about 100 cases with better and more rapid results than from other methods. The treatment is based upon the assumption that the disease is one of the integument and not of the hair.

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INSTINCT AS A GUIDE IN HEALTH AND DISEASE.

ONE of the most interesting problems presented to the medical man is the question, How far is Nature to be trusted? It is universally admitted that without her assistance we can do nothing, and that in the main her impulses are in the right direction. But are they always so? How far may we encourage our patients to follow their appetites and desires? Popular opinion says, "not at all," and our practice in the past has certainly given some ground for the rule. Our attitude toward the likes and dislikes of our patients is generally believed to be that of the nursery-maid, who sent the eldest member of her flock to "find Tommy and Flossy, see what they're doing, and tell 'em they musn't." As a matter of fact, the position occupied by the medical profession to-day is totally different from this, and we think it high time that official statement were made to that effect.

What then is the true value of instinct as a guide? Instinct is the crystallized experience of thousands of generations—or, to vary the metaphor, it is the golden seed-wheat chosen of a million harvests, threshings, and winnowings. It ranks lower than reason, because less of individual volition or judgment enters into it; but as a guide it is far safer, and is a spring of action far more reliable and effective, and so far as it goes it has no superior. Our lifelong struggle to form "good habits" is, by accurate analysis, merely an effort to change rational preferences into instincts. The beauty, the accuracy, and the beneficence of the instincts of the lower forms of life have been the marvel and the admiration of every observer and philosopher. Out of a thousand instances we need merely suggest the architectural instincts of bees and ants, the migrations of birds and fishes, and the chrysalis-making of moths and butterflies. But it is calmly assumed that in our own species alone instincts have utterly lost their force and value. Our pride would not permit us to depend upon or even to recognize them, lest we should seem to admit our kinship to "mere brutes."

Fortunately for us, our instincts still remain with us, in spite of our haughty refusal to recognize them officially, and control two-thirds of our actions; and it would be to our credit and benefit in every way if they controlled the majority of the remainder. Every time we neglect them we suffer. It is, of course, unnecessary to say that the great mass of our most important vital movements, such as breathing, swallowing, suckling, eating, drinking, walking, etc., would be impossible without instinct; but beyond all this, whenever we can find an instinct to follow, it is, nine times out of ten, safe to do so, even under civilized conditions.

Every physician must know that if civilized man would only follow his instincts in respect to fresh air, sunlight, exercise, food, water, bathing, etc., he would be far healthier, happier, and even more moral than he now is. Our dyspeptic race would be better in every way for a greater indulgence in "the pleasures of the table" (including *at least* twenty-two minutes for dinner), for more cat-like basking in the sun, for a good deal more "barbaric indolence," for more rebellion against the fiendish old saw that "Satan finds some mischief still for idle hands to do," for a more frequent giving way to the impulse to fling the yardstick out of the window and the ledger under the desk, and away to the woods, the fields, and the mountains! If the grown man would but run away and "go swimmin'," as the boy does!

An excellent illustration is the case of intoxicants and narcotics. Did any one ever hear of a baby

with an instinct for whisky or a child that enjoyed the taste of tobacco or the smell of a cigar? Tongue, nose, and stomach unite in their disapproval of all three, as the comic horrors of a boy's first smoke and the racking headache of the freshman's spree abundantly testify. It is only by systematic and repeated repression of instinct by "reason" and "higher intelligence" that these or cognate habits form; yet we have the colossal impudence to say that a man who is reeling drunk has "made a beast of himself." This is by no means an exceptional instance; indeed, it would hardly be too extreme to say that a large proportion of the diseases of civilization are due to the neglect or deliberate repression of some instinct.

However valuable instincts may admittedly be in health, the almost universal impression in both popular and professional circles is that they are just the reverse in disease. The sick man is popularly supposed to want just those things he should not have, and to dislike those things that are "good for him."

Indeed, altogether too much of both household and professional medical treatment was originally constructed on that very principle. Its chief reliance was placed upon "bitters" of all kinds, blisterings, bleeding, starving, etc.; in fact, the more disagreeable the drug or process, the more violent its effects, the greater its curative power was supposed to be. Even at this day a "medicine" must usually be bitter or it isn't much thought of by the laity, and a "hygienic dietary" is commonly constructed simply by forbidding everything that the invalid has any desire for.

The simple truth of the matter, unflattering as it may be to our professional pride, is that even up to the middle of the present century the old demon-theory of disease had far too much influence upon our therapeutics. Disease was still regarded as an entirety that must be driven out of the body of the patient by more or less violent or repulsive means. This distrust of the instincts in disease is not medical, but priestly. The wonderful "progress of modern medicine" has consisted very largely in getting rid of this idea. Wounds, for instance, instead of being poured full of wine, or oil, or turpentine, or other irritating substances, or burned with hot irons, or kept gaping for weeks, "to establish suppuration," or dressed with earth, cobwebs, pitch, or even excrement, are now simply thoroughly cleansed, closed as accurately as possible, and protected by the softest and lightest of dressings. In short, we simply follow our natural impulses, imitate the lower animals, and the result is that our mortality-rate after both accidents and operations is reduced more than 50 per cent.

In fever, for instance, the parched and gasping patient, instead of being swathed up to his neck in blankets, kept in carefully heated and darkened rooms, with doors and windows religiously closed, forbidden cold water, or, indeed, cool drinks of any kind, as if they were deadly poison, and systematically starved upon a "fever-regimen" of slops and washes of every description, is now-a-days placed between the coolest of sheets, and with the lightest of covering in cool, breezy, sunshiny rooms, is systematically fed with the most nourishing and digestible of foods, given water and fruit-juices freely, and not only bathed, but even put to soak in cold water.

Our most modern and most successful treatment of typhoid fever consists merely of a liberal milk-diet, encouraging the patient to drink at least a gallon of water a day, and plunging him into a cold bath whenever his temperature rises above a certain point. Again, we simply respond to the demands of poor, hot, thirsty Nature; and by so doing have lowered the death-rate from 16 per cent. to less than 5 per cent.

Even in morals the value of instinct as a guide is considerable, although there is here a certain amount of conflict between the individual or selfish instincts and the social or altruistic ones. While it is true that the interests of our vital desires or appetites are often so great as to cause us to disregard the rights of others in their gratification and thus violate our high or social instincts—"to sin," in theologic language—yet it is also true, as beautifully pointed out by Darwin, that the former are essentially temporary in their range and capable of but feeble recollection. The latter, on the other hand, are absolutely ceaseless in their action, and produce by their violation most lasting and powerful sensations, such as shame, remorse, loss of self-respect, feeling of isolation, etc., which become even more vivid with each successive recollection. In fact, the higher instincts, though at the time feebler, are in the long run more than a match for the lower. It would, indeed, be strange if the instincts that have *created* morals were not still to be trusted in their further extensions and outworkings.

EDITORIAL COMMENTS.

The Influence of Medical Libraries on Medical Literature.—All experiments on human beings are likely to produce unpredicted results. We venture, however, a prophecy: If the movement to introduce the study of medical literature into the medical course should succeed, each medical school would have its library, in which each student would be required to work at daily tasks. In a short time the result would be a critical literary spirit in the medical profession. If medical students learned as much of medical literature as students of biology now learn of the literature of biology, many medical works would have a diminished sale, and other works would have an increased sale in spite of a large cost-price. The trash that now forms a great part of the periodic literature would be excluded on the protest of the readers; or, it may be, only those journals would be patronized that furnished valuable medical thought in good form.

Some publishers may be so short-sighted as to think that every book that they put into a medical-college library will diminish many-fold that book's sale. This can only be the case when the book is unworthy. The college-library, in conjunction with the study of medical literature in the college-course, would increase the sale of the best medical literature, and, it is to be hoped, would diminish in some degree the sale of books of low degree now being so persistently exploited upon the medical profession. The systems and text-books of the commercial doctors and cheap publishers are debauching now the taste of the profession. Some radical means must be taken to counteract this influence. The study of medical literature in the medical schools is a promising educational advance, and a powerful adjunct to a better professional life. No other means of study gives so much interest to medical and surgical investigation. The broad outlook on life, and on professional life especially, that every young medical man should possess, is best inculcated by a study of the inheritance transmitted through our literature.

Those publishers would be short-sighted, indeed, who would not encourage this departure in medical education, so well adapted to magnify all that is good in their business. Those medical men who are now encouraging by their labors and their wealth the advancement of education in other directions can do their own profession a service by helping on this movement.

The Economic Advantages of the Metric System.—A select committee of the House of Commons, composed of seventeen members, held fourteen sessions, and after careful examination of many witnesses, and despite the proverbial dislike of Englishmen to change, all but one member voted to report that the metric system should be at once made legal, and within two years compulsory. The committee recites the economic disadvantages of the English system of weights and measures, and goes on to say that "not only is foreign trade in every branch seriously handicapped, but that the home-trade would be benefited by the adoption of more simple and uniform standards. . . One year's school-time would be saved if the metric system were taught in place of that now in use." From this judicious and judicial statement we may easily calculate one item of the cost of keeping up the antiquated and clumsy system of our weights and measures. If in every life one year's time is lost, and if we have forty-million of adults in our population, we are wasting thirty or forty million years every forty years, or a million years a year. As the average length of life is about forty years, this is equivalent to an annual expense of 25,000 lives. This looks laughable, but is there any hitch in the logic? If we lost 25,000 lives a year by cholera, what a hullabaloo would be raised! This is besides the commercial losses from trade, and also does not include the teachers' salaries! In medicine and science generally the expense is incalculable. The time wasted by one-hundred-thousand physicians in calculating the dosage and in writing prescriptions with our absurd grains, scruples, drams, ounces, pints, drops, and spoonfuls, would permit us to go to bed earlier every night or take a vacation each summer.

The Causes of Death in Coroners' Reports.—The report of the Coroner of the city of Philadelphia for the year 1894, as published in the report of the Bureau of Health, shows that 2231 inquests were held by that official during the year. The causes of death are given in 1181 cases, and then the statement is made that "other causes" were responsible for 1050 deaths! We have not been able to find in any text-book or encyclopedia at our disposal any reference to "other causes" as a factor in producing death. That this condition should be so mortal as to be responsible for nearly one-half of the deaths in the Coroner's cases, and yet be unrecognized by the medical profession, is quite startling. The unknown causes number a little more than one-hundred. The known causes include heart-disease, apoplexy, pneumonia, alcoholism, accidents of various kinds, suicide, and homicide. Now what other violent or sudden deaths are contained in the general term "other causes" we are at loss to understand. In Chicago and Brooklyn, it is rumored that railroads and other corporations find it advantageous to report fatal accidents as deaths from "other causes," although they often use such convenient phrases as "shock" and "concussion" in the death-certificates. In previous reports of the Coroner "other causes" has likewise figured as being responsible for from 40 to 50 per cent. of deaths coming under his notice.

SOCIETY PROCEEDINGS.

BRITISH MEDICAL ASSOCIATION.

Sixty third Annual Meeting, held at London, July 30 and 31, August 1 and 2, 1895.

(Concluded from page 194.)

FOURTH DAY—AUGUST 2D.

DR. EDWARD ALBERT SCHÄFER delivered the Address in Physiology, which was entitled

ON INTERNAL SECRETION.

He pointed out that a secreting organ separates certain materials from the blood, and pours them out again—usually after effecting a change of some sort in them—upon external surfaces, or at least upon surfaces that are connected with the exterior. These form the secretions

that are most commonly known under that name. On the other hand, some secreted materials are not poured out upon an external surface at all, but are returned to the blood. These may be termed internal secretions, and they may be and are of no less importance than the better known and more fully studied ordinary or external secretions. The name of gland is the one that is usually applied to a secreting organ; and to those that furnish only internal secretions the name "ductless gland" has been applied. It is not, however, the ductless glands alone that possess the property of furnishing internal secretions. Every part of the body does, in fact, take up materials from the blood, and does transform these into other materials. Having thus transformed them they are ultimately returned into the circulating fluid, and in that sense every tissue and organ of the body furnishes an internal secretion. Moreover, certain important glands, which are provided with ducts, possess not only the faculty of yielding an external secretion, but have equally important, if not even more important, functions in connection with internal secretion. Thus both the liver and the pancreas are more essential to life, by virtue of the internal secretions that they furnish to the blood, than by their better known external secretions. The entire removal of either of these organs causes death, and this is due to the removal of the influences that they exert on the metabolism of the body by the loss of their internal secretions, and not to the cutting off of their external secretions. In the case of the liver it is well known that the bile may be diverted by a fistulous opening without any serious interference with the vital functions; and the same is the case for the pancreatic juice. The kidney is another instance.

The same result is not obtained with all glands. The salivary glands may be entirely removed without any marked symptom supervening. This is also well known to be the case with the mammary glands. On the other hand, removal of the generative glands leads to marked alterations in the development of other parts of the body. In the last-mentioned case the changes are probably produced through the nervous system, and are not connected with the internal secretion of the glands; and with respect to the salivary and mammary glands, we may assume that although they yield an internal secretion of some sort to the blood, it is of the same nature as that yielded by other organs, and that such other organs may act vicariously for those removed. This is, however, inapplicable to the liver, the kidney, or the pancreas; removal of which or restriction of their internal secretions is inevitably followed by a fatal result.

The liver affords an excellent illustration of the fact that internal secretions may, like ordinary or external secretions, either serve some useful purposes in the body (secretions proper) or may be formed only to be got rid of (excretions). The formation of sugar is an example of a useful internal secretion; that of urea of what would be termed in the ordinary sense an excretion, although urea is not actually got rid of by the liver, but is produced by that organ, to be got rid of by the kidney.

Among the racemose secreting glands the pancreas offers a characteristic peculiarity of structure. Besides the secreting alveoli and ducts, the pancreas possesses a peculiar epithelium-like tissue which occurs in isolated patches throughout the organ, and which is characterized by its extreme vascularity. We know of no other externally secreting gland that contains such islands of epithelioid tissue.

It was formerly believed that the sole function of the pancreas was to yield pancreatic juice, and this is in itself a sufficiently important function, seeing that this fluid contains ferments which act on all the principal organic constituents of the food. It had indeed been remarked that cases of glycosuria occurring in the human subject were frequently associated with disease of some kind of the pancreas. Frerichs found that 20 per cent. of the total number of cases of diabetes that came under his notice were accompanied by obvious changes in the pancreas. Rokitansky found in 13 out of 30 cases that the pancreas "was strikingly small, hard and bloodless; and in many cases it has been found so shrunken and altered as to be hardly recognizable save by its connections" (Silver). Claude Bernard had attempted as long ago as 1855 to remove the pancreas entirely, but all his attempts were unsuccessful, in so far that the animals speedily succumbed. In 1889, however, the operation was successfully performed by von Mering and Minkowski. They found that in all cases in which the entire pancreas was removed the operation was followed within the space of a very few hours by the appearance of sugar in the urine, and this to a great extent—as much as from 5 to 10 per cent. being found even in fasting animals.

Accompanying the condition of glycosuria there is also produced polyuria; and these conditions occur even under a purely flesh diet, and are accompanied, as might be supposed, by rapid wasting, and followed within the space of fifteen days or less by death. This result is not due to the loss of pancreatic secretion, for the pancreatic juice may be diverted by a fistula, and the animal may remain in perfect health. Nor is it due to the loss of the secreting structure; for it has been found possible to destroy the secreting structure of the organ without the supervention of diabetes. This was done successfully by Schiff in 1872. Schiff's method, which was a repetition of experiments by Bernard, was the injection of paraffin into the duct of Wirsung. In Bernard's original experiments all the dogs operated upon speedily died; but this was probably due to accidental causes, and not to the actual destruction of the pancreatic tissue, for in Schiff's experiments the dogs survived and remained in perfect health. The fact that removal of the pancreas is followed by glycosuria was not at that time known, and the appearance of sugar in the urine was not therefore looked for by Schiff. But there can be no doubt of the absence of any severe form of diabetes, because the animals underwent no wasting.

Recently the experiment has been repeated by Hédon and by Thiroloix. Thiroloix found that, although the gland was reduced by the process of atrophy supervening on the injection to a mere rudiment, symptoms of diabetes do not occur. It is well known that if a portion of the pancreas be left—about one-quarter or rather more—no glycosuria appears. In the great majority of these cases the animals remain healthy, so that it is clear that a portion only of the gland can prevent the diabetic symptoms. Nor need the portion of gland that is left remain in its ordinary situation. A fragment of the gland either from the same or from another animal may, in fact, be grafted elsewhere into the peritoneal cavity or under the skin. Provided the grafting be successful, and the portion of the gland employed be of sufficient size,

removal of the pancreas is now no longer followed by the usual symptoms. The animal may remain, in fact, in perfect health. If, however, at any subsequent time the grafted portion of pancreas is removed, diabetes supervenes, and the animal dies within a short time, as after a primary removal. It has been shown that the grafting of a portion of pancreas, the secreting part of which had been destroyed by injection of paraffin along the ducts, is also efficacious in preventing the advent of diabetes after removal of the pancreas. It must therefore be assumed that the material, whatever it may be, which is furnished by the pancreas to the blood, and which prevents excessive formation of sugar in the blood and in the urine, must be formed by some other constituents of the gland than the secreting-cells; for there is every reason to believe that these cells are eventually completely destroyed after the ducts have been blocked in the manner described.

It is a question whether the gland which has been thus caused to atrophy still shows the interstitial vascular epithelium-like tissue referred to; but it is extremely probable, in fact almost certain, that this tissue does not participate in the atrophy of the secreting part of the gland, and it seems, therefore, fair to assume that the pancreas mainly owes its function as an internally secreting organ, at least so far as regards the prevention of diabetes, to this tissue, which is apparently peculiar to it among secreting-glands. Various theories have been put forward to account for the effect upon carbohydrate-metabolism of removing the pancreas. It is, however, still entirely unknown how the pancreas does actually act. The effects of grafting just described entirely negative the view that the result is due to interference with the ganglia and sympathetic nerves at the back of the abdomen, a supposition that was at one time brought forward to explain the diabetes resulting from removal. It has been stated by Valli that in dogs which have been rendered diabetic by removal of the pancreas injection of pancreatic emulsion into the blood causes a disappearance of the diabetic symptoms, and many instances have been recorded of diabetes in man which, it is stated, have been benefited by the exhibition by the mouth of raw pancreas. With regard, however, to these statements, it may be remarked that the danger of injecting emulsion of raw pancreas into the blood would be great, on account of the tendency that extracts of gland-cells have to produce intravascular clotting; and, so far as the treatment by feeding with raw pancreas goes, it has been found that in dogs with pancreatic diabetes the excretion of sugar is not decreased, but increased, by giving raw pancreas with the food, even although this be of an entirely proteid nature. The only fact that appears certain in connection with the manner in which the pancreas prevents excessive production of sugar within the body is that this effect must be produced by the formation of some material secreted internally by the gland, and probably by the interstitial vascular islets, and that this internally secreted material profoundly modifies the carbohydrate-metabolism of the tissues. That it does so by influencing hypothetic "sugar-centers" in the bulb, as has been conjectured, is for various reasons improbable.

The next internal secretion for consideration is that of the thyroid gland. The process of study is in one sense simpler in this case, as there is no external secretion. That the thyroid gland is a secreting-gland no one who studies its structure and its mode of development can well doubt; except that it is unprovided in the adult state with a duct, it has all the features of structure of secreting-glands. It is formed of alveoli which are lined by epithelial cells, and these cells have been observed to exhibit changes after treatment with pilocarpin in no way dissimilar to those changes that have been noticed under like circumstances in the cells of true secreting-glands. Further, we can observe the secreted material within the vesicles of the thyroid, in the form of the substance known as "colloid."

The gland is extremely vascular and very richly provided with nerves, and both bloodvessels and nerves come into very close relationship with the secreting-epithelium. The glandular structure of the thyroid is more obvious in young than in old animals, and as age advances the organ undergoes a gradual process of degeneration, so that in advanced age its normal glandular structure can only with difficulty be recognized. As long ago as 1856 Schiff showed that extirpation of the thyroid in dogs is invariably followed by a fatal result. This observation, important as it now seems, fell for many years into oblivion, and it was not until clinical observations had again pointed to the importance of the gland that Schiff's experiments were remembered. These observations may be said to have commenced with the discovery of the disease known as myxedema by Gull in 1874, although the connection of that disease with affections of the thyroid was first recognized by Ord in 1878—an observation that has since been abundantly confirmed. In 1882 J. and A. Reverdin described the symptoms following upon complete removal of the thyroid body for goiter, and they recognized these symptoms as identical with those of the disease that had been described under the name of myxedema; they accordingly termed the collection of symptoms "operative myxedema." The results of the Reverdins were speedily followed by those of Kocher, who described, in a large number of cases, similar symptoms as following entire removal of the thyroid in man. Kocher pointed out that the effects are most marked in young subjects, and that they may not occur at all or be little manifest as age advances. These observations led to a renewal of his former experiments by Schiff, who, in 1884, published the results of sixty thyroidectomies upon dogs, in all of which the result was speedily fatal, the operation being quickly followed by the supervention of symptoms—tremors, spasms, and convulsions—which seemed to point to a serious disarrangement in the nutrition of the central nervous system. Schiff also discovered the fact that symptoms are prevented by a previous graft of a portion of the gland beneath the skin or into the peritoneal cavity.

The subject now became one of general interest and was taken up actively by many experimenters. In England Horsley, by employing monkeys—which survive the operation, as a rule, considerably longer than dogs—discovered that the myxedematous condition which is so characteristic of the removal of the thyroid in man is also produced in animals. It was further found by Allard and by Ewald that no results are obtainable by thyroidectomy in birds, and most observers state that the same is the case with rodents and herbivora generally. The absence of the result in birds has never yet

been satisfactorily explained; but various attempts have been made to explain the frequent absence of result in herbivora. It may be either that a portion of the gland has been left behind, or that there existed in the particular cases in question accessory thyroids and parathyroids separated from the main body, and not removed in the operation. This is the explanation given by Gley of the negative results that usually attend thyroidectomy in rabbits. Gley states that if in these animals care be taken to remove the accessory structures as well, the usual symptoms supervene. Whether this is a sufficient explanation of the lack of result obtained by other observers remains yet to be proved.

The symptoms that follow thyroidectomy are of two classes—nervous and metabolic, although we are not able to say that the nervous symptoms are not produced by metabolic changes in the tissues of the nervous system; nor is it certain that the metabolic changes in the tissues are not consequent on alterations in the nervous system. The most characteristic nervous symptoms are those that have been already mentioned—muscular tremors, passing gradually into spasms, and finally into convulsive attacks. These cease on section of the nerves passing to the muscles. They are, therefore, of central origin; indeed it has been shown that the excitability of the cortex of the brain, and even of the lower centers, is materially modified in animals that have suffered thyroidectomy. The metabolic changes that occur are most obvious in the connective tissues, and especially in the integument. These tissues become edematous, but the edema is not of the ordinary character. The fluid contains a superabundance of mucin; the integument swells, but at the same time the surface becomes dry, and there is a tendency to the shedding of hairs and of the superficial epithelium. This mucinous change is followed, if the animal remains alive for a sufficient time, by atrophic changes.[1] The nervous affection that primarily results is usually accompanied by slight fever. Later on, this passes off and the temperature becomes reduced, even to some degrees below the normal. These effects of thyroidectomy can be entirely prevented by thyroid grafts, and can be temporarily prevented either by injection of thyroid juice under the skin or even by taking thyroid juice or raw thyroid by the mouth. Dr. G. R. Murray has described the case of one monkey in which, in consequence of the removal of the thyroid, all the symptoms of myxedema had appeared, which was completely cured by repeated subcutaneous doses of thyroid juice. He does not, however, state how long the animal was kept under observation after treatment, and whether the cure was permanent. It is, indeed, scarcely probable that the subcutaneous injection or the taking by the mouth of thyroid juice would be followed by more than a temporary removal of the symptoms. The effects of grafts, however, are to all intents and purposes permanent, and it has been found, as in the case of the pancreas, that removal of the graft which has maintained the health of the animal after extirpation of its own thyroid is speedily followed—as with primary removal of the organ—by the usual symptoms of thyroidectomy.

Various theories have been advanced to account for the effects of removal of the gland. H. Munk holds, or until lately held, that the effects of removal are entirely due to interference with adjoining nervous structures in the neck. But this, as in the similar theory propounded to account for the effects of extirpation of the pancreas, is absolutely negatived by the results of thyroid-grafting. Besides this theory, which must at once be dismissed, there are two others which may be regarded as disputing the ground between them. Of these the one may be called the theory of "autointoxication," and the other that of "internal secretion." The autointoxication-theory assumes that there is a certain toxic substance which is constantly tending to accumulate in the blood, and which it is the duty of the thyroid gland to render innocuous and to remove. According to this, the function of the thyroid would be primarily excretory. This view is supposed to be supported by the statement that in animals which are dying after removal of the thyroid the blood is toxic for other animals, and especially for those that have already had the thyroid removed, although this operation may have been performed only a short time previously, and before the symptoms of thyroidectomy have had time to develop. It is not stated what the probable nature of this substance is, or by what tissues it may be formed. The "internal-secretion" theory would explain the phenomena of extirpation as due to the absence of a secretion which is formed within the thyroid, and which is passed into the blood, possibly through the medium of the lymphatics: a secretion which is necessary for certain of the metabolic processes within the body, and especially for those connected with the nutrition of the central nervous system and of the connective tissues. In the first place, beneficial and not toxic effects follow the exhibition of thyroid juice both in cases of thyroidectomy in animals and in myxedema and other affections in man. Secondly, extract of thyroid gland, whether prepared with water or glycerol and whether previously boiled or not, produces a distinct action upon the blood-vessels, so that the blood-pressure markedly falls, although the beats of the heart remain at about the same rate and of the same strength. This lowering of the blood-pressure without influencing the action of the heart can only be produced in one way, namely, by increasing the caliber of the arteries. Before this effect upon the blood-pressure was discovered it had been shown that the exhibition of thyroid juice or other preparations of thyroid in the human subject has a tendency to increase the caliber of the radial artery. It would seem, therefore, that the juice of the thyroid and extracts which are obtained from the gland have a distinct action upon the vascular system. Lorrain Smith found that in animals that have been deprived of the thyroid body the reaction to changes of temperature was abnormally rapid. When normal animals are exposed to a cold atmosphere the production of carbonic acid becomes increased consistently with the increased oxidation that is necessary to cause an increased production of heat, but this increase of carbonic acid does not take place immediately, but only comes on after a certain period of time, the temperature of the body being

[1] Semon has enunciated a theory to the effect that removal of the thyroid produces an interference with the full chemic development of the constituents of the connective tissues, so that these tend to take on an embryonic character, and it is well known that excess of mucin is characteristic of embryonic connective tissue.

in the meantime maintained normal by those physical changes which occur in the circulation, and which allow the quantity of blood brought to the skin, and the amount of heat thereby lost from the general surface of the body, to be varied. It is precisely these vasomotor changes that appear to be lacking after removal of the thyroid; for the production of carbonic acid becomes almost immediately increased by exposing thyroidectomied animals to a low temperature. That the thyroid gland yields an internal secretion which effects a useful purpose within the body appears to result conclusively from these facts, and the effects which follow thyroidectomy are probably due to the loss of that secretion. Whether the gland also possesses the function of destroying toxic products of metabolism that would otherwise tend to accumulate in the bood is a point that requires the production of more conclusive evidence before it can be regarded as established.

The next organ the internal secretion of which may be considered is the pituitary body. It is well known that the anterior lobe of the pituitary body is a structure that may in general terms be described as glandular, and although not in all respects resembling the thyroid there are nevertheless certain points both in connection with its mode of development and in the structure of the fully formed organ that might lead to the supposition that there is something functionally common to the two organs. So far as destruction of the pituitary body is concerned, experiments have given interesting results. The organ has been removed successfully in a number of cases in cats and in dogs. In all instances of complete removal death results, usually within a fortnight of the operation. The symptoms are (1) a diminution of the body-temperature, (2) anorexia and lassitude, (3) muscular twitchings and tremors, developing later into spasms, (4) dyspnea. Many of the symptoms show abatement after injection of pituitary extract. Vassale and Sacchi conclude that the pituitary must furnish an internal secretion which is useful in maintaining the nutrition of the nervous and muscular systems. Some of these symptoms, especially the muscular twitchings, are similar to those seen on removal of the thyroid. Moreover, it has been stated that after thyroidectomy the pituitary body becomes enlarged; and Rogowitsch has supposed that the fact that in rabbits thyroidectomy commonly fails to produce the usual results is due to the pituitary taking on a vicarious action, the pituitary being larger in proportion in the rabbit than in most animals.

Similar statements with regard to its enlargement have been made in cases of myxedema in which the pituitary has been examined. But, on the other hand, Schönemann, who examined the pituitary in a large number of cases of goiter, got no distinct evidence of its enlargement in that disease nor of any other marked change. And whereas enlargement and degeneration of the thyroid are accompanied by cretinism and myxedema, there appears to be a close connection between enlargement and degeneration of the pituitary body and an entirely different disease first described by Marie, namely, akromegaly, the most obvious symptoms of which are hypertrophy of the bones of the extremities and of the face, with some hypertrophy of the skin and mucous membranes, but without mucinoid degeneration. Moreover, the theory that the thyroid and pituitary may act vicariously appears to be entirely negatived by the physiologic effects produced by extract of the last-named gland. Tracings of the blood-pressure and heart-beats show that, whereas thyroid extract produces no obvious effect upon the contractions of the heart, decoction of the pituitary body causes great augmentation in the force of the heart's beat without, however, any accompanying acceleration of the rate. Further, the effect upon the arteries is precisely the reverse of that which is obtained by extract of thyroid. The blood-pressure rapidly rises, and that this rise is not due simply to augmentation of the heart's beats, but that it is also due to contraction of the arterioles, is sufficiently shown by the fact that if salt-solution containing pituitary extract be passed through the bloodvessels of a frog, the entire nervous system of which has been destroyed, the vessels markedly contract. This experiment conclusively shows that the effect upon the arteries is unquestionably a direct one, and in all probability this is the case also with the heart.

It may be fairly supposed, then, that the pituitary body also furnishes to the blood an internal secretion, and it would appear that this internal secretion tends to increase the contraction of the heart and arteries and to influence the nutrition of some of the tissues.

Lastly, the internal secretion of the suprarenal bodies may be considered. The immense importance of these glands in nutrition was indicated by Addison, who, in 1855, pointed out that the symptoms of the disease now known by his name are associated with pathologic alterations of the suprarenal capsules. This observation was tested experimentally by Brown-Séquard, who found (1856) that removal of the suprarenal bodies was rapidly and unfailingly fatal in all animals. The symptoms following the removal are practically those of Addison's disease, although much more acute. There are extreme muscular weakness and great loss of tone of the vascular system, with ultimately nervous symptoms, loss of appetite, and other signs of general prostration. But the pigmentation that usually accompanies disease of those organs was not noticed by Brown-Séquard, and he inferred that this absence of pigmentation was probably due to the fact that a fatal result appears so rapidly after the complete removal of the capsules in animals that time is not afforded for the development of this symptom. This conjecture appears to have been confirmed by an experiment of F. and S. Marino-Zucco, who state that by inoculating the suprarenals of rabbits with pseudo-tubercle bacillus they have succeeded in obtaining not only the slow development of the ordinary symptoms of suprarenal removal, but also an augmentation in the pigmentation of the skin and hair. The experiment, however, requires confirmation.

It is needless to state that Brown-Séquard's results, following as they did upon Addison's observations, attracted much attention, and numerous investigators set to work to verify them. But many of these failed to confirm the results that were obtained by Brown-Séquard, probably by reason of the removal being incomplete or of the existence of accessory capsules; and after a few months of controversy the subject gradually dropped, and became for a long time almost forgotten. The interest in this subject has been, however, recently revived, and the experiments of Brown-Séquard have been repeated by various observers, including Brown-Séquard himself, Abelous and Langlois, Tizzoni, and many others.

Dr. Schäfer has himself made several experiments of the same kind on various animals (monkeys, dogs, cats, and guinea-pigs). All these observations have tended to confirm the original statements of Brown-Séquard. They show that animals deprived of their suprarenal capsules die rapidly, usually in the course of two or three days, with the symptoms noted, and the further fact is mentioned by Abelous and Langlois, and this is also confirmatory of a statement of Brown-Séquard, that the blood of animals dying in consequence of the removal of the suprarenal capsules is toxic for other animals which have recently been deprived of their capsules, although it causes no toxic results in normal animals.[1]

The symptoms caused by this blood are said by Abelous and Langlois to be those of curare-poisoning—paralysis, that is to say, of the intramuscular nerve-endings; and as the most marked phenomenon resulting from removal of the capsules is extreme muscular weakness, it has been concluded by them that after removal of these glands a certain toxic product of muscular metabolism accumulates in the blood, and that the function of the glands is to remove or destroy this toxic principle.

This is the "autointoxication"-theory of the suprarenal capsules, and is similar to that which has been applied to the thyroid body. Like the other autointoxication-theories it is chiefly founded upon the fact that the blood of animals which are moribund in consequence of the particular extirpation is toxic, especially for other animals that have been submitted to the operation. But is it not probable that the blood of an animal dying slowly as the result of any disease would be toxic to some extent, and that the toxic principles would more powerfully affect animals whose resisting power has been lessened by a recent severe operation? However this may be, whether the suprarenal capsules do or do not destroy a toxic principle which is formed elsewhere, and which would otherwise accumulate in the blood, they unquestionably produce a material that has properties entirely different from those stated to be possessed by the blood of animals deprived of their capsules. This material, which is probably the basis of the internal secretion of the glands, has most active physiologic properties, and to these attention will next be directed.

Experiments upon normal animals with extracts of suprarenal have been performed by a number of observers, but by all in a very incomplete manner. For the most part they have been satisfied to inject subcutaneously extracts made with water and other menstrua, and to observe the symptoms, if any, which result. As a matter of fact, in some animals that are so treated there are no obvious symptoms. The guinea-pig will stand a large subcutaneous dose of suprarenal extract without showing any symptoms at all, or with, perhaps, only a slight acceleration and increase of the force of the pulse. The same appears to be the case with the cat and the dog, unless a very large dose be injected. Rabbits, on the other hand, are extremely susceptible to the influence of suprarenal extracts. If a large dose be given, the animal may succumb within half an hour. If, on the other hand, the dose be only moderate in quantity, it may not show any symptoms at all for some hours, and then it may suddenly succumb. This primary absence of symptoms has been also noted by Foà and Pellacani in dogs, who state that in many of the animals which they experimented upon in this way there were no symptoms at all apparent upon the day upon which the injection was given, but that the next morning the animal was usually found dead.

The cause of death, it may be added, in this case is not by any means clear. Foà and Pellacani have supposed that it may be due to paralysis of the respiratory center, but the slight effect that intravenous injection of suprarenal extract produces upon this center does not lend support to this conjecture.

The physiologic effects of intravenous injection of suprarenal extract are far more striking. Experiments by Dr. George Oliver and Dr. Schäfer, performed during the last two years, show conclusively that the medulla of the suprarenal capsule contains a dialyzable organic principle, soluble in water, and not destroyed by boiling for a short time, which exerts a powerful physiologic action upon the muscular system in general, but especially upon the skeletal muscles, the muscular walls of the bloodvessels, and the muscular wall of the heart. A certain amount of action is also manifested upon some of the nerve-centers in the bulb, especially the cardio-inhibitory center, and to a small extent upon the respiratory center.

The effect upon the skeletal muscles is well shown in the frog, and can also be seen in mammals. The contraction of the muscle in response to a single excitation of its nerve is as ready as in the normal animal; but it is greatly prolonged, so that the result is comparable to that produced by a small dose of veratrin, which has the effect of enormously increasing the contraction resulting from a single stimulation of the muscle or its nerves. It is in no way comparable to a curare-effect, for the muscles remain as excitable through their nerves as before. It is, therefore, an effect entirely different from the so-called autointoxication-paralysis that is stated to result after removal of the suprarenal capsules in animals, and the material that is extracted by water, therefore, from the suprarenal capsules is certainly not the same material that is said to accumulate in the blood after the removal of those organs.

The action upon the circulatory system may be divided into the action upon the heart and the action upon the arterial system. Upon the heart the effect differs according as the vagi are cut or uncut. When the vagi are uncut, and the heart is therefore still in connection with the cardio-inhibitory center in the medulla oblongata, the action of suprarenal extract is to slow, and even to stop entirely, the contraction of the auricle. Under these circumstances the ventricle continues beating with an independent slow rhythm. The result is to cause the pulse to be very slow. On the other hand, when the vagi are cut or their cardiac ends paralyzed by

[1] It is stated by Brown-Séquard that injection of extract of suprarenal under the skin of animals, the suprarenal capsules of which have been removed, has a partial success in prolonging life. Dr. Schäfer knows of no cases in which animals in this condition have been kept alive for any length of time, either by injection in this way or by the taking of suprarenal by the mouth. Nor is he aware of any successful attempts that have as yet been made to effect a graft of the organ into another place, although there can be little doubt that if such a graft were to become successfully rooted, the result would be similar to that which is got with grafts of pancreas and of thyroid. It appears, moreover, to be true that some cases of Addison's disease are distinctly benefited by extract of suprarenal capsule, taken by the mouth.

atropin, the effect upon the heart is precisely the reverse. The strength and frequency of the auricular contractions are markedly increased, and those of the ventricle are correspondingly augmented. This naturally has the effect of sending a vastly greater amount of blood into the arteries, which by itself would alone produce a great rise in the arterial pressure. The direct action upon the arteries is, however, quite as marked as that upon the heart. If the blood-pressure be taken in a dog in the usual way by connecting a mercurial manometer with the femoral artery, and if a minute dose of suprarenal extract be now injected into a vein, it is found that even with the vagi uncut and the heart therefore slowed by the action of the extract the blood-pressure rises considerably. But with the vagi cut or paralyzed by atropin the rise can only be characterized as enormous.

The contraction of the arteries is further exemplified by the fact that if an organ such as a limb or the kidney or the spleen be enclosed within a plethysmograph, or oncometer, the instrument indicates an enormous diminution in volume of the organ, which can only be accounted for by a contraction of its arterioles. This contraction is produced by the direct action of the drug upon the muscular tissue of the smaller arteries, and not indirectly through the vasomotor center, for it obtains in the mammal equally well with the spinal cord cut or the bulb destroyed, or even in the case of the arm after the brachial plexus has been severed. In the frog it is produced also with the brain and spinal cord completely destroyed and salt-solution containing suprarenal extract allowed to flow through the arteries.

Under these circumstances the flow of fluid, which without the suprarenal extract may have been comparatively rapid, becomes almost completely stopped, and this can only be due to the direct action of the extractive substance upon the muscular tissue of the smaller arteries. After the vagi have been cut the blood-pressure may rise to four or five times its original height; no other known agent will produce such an enormous increase of pressure except direct stimulation of the vasomotor center. It is not the case, however, that this center is stimulated by the drug, for the action is essentially a peripheral one.

The effect passes off in the course of a few minutes. After a dose, no matter whether small or large, has been injected into a vein, and has produced the results noted, the bloodvessels slowly resume their ordinary caliber, the augmentation and increased frequency of the heart's beats become gradually lessened, and the blood-pressure recovers its normal condition. Whilst the pressure is raised under the action of suprarenal extract, there is apparently no possibility of inhibiting the arterial contraction; even the strongest stimulation of the depressor nerve, which under ordinary circumstances produces through the vasomotor center a marked dilatation of the arterioles, is without result during the activity of this extract. The question naturally arises, How is it that the effect so soon disappears? In what manner is the active principle eliminated? It is not eliminated by the kidneys, for the effect passes off just as quickly, even although the renal arteries are clamped. It is not eliminated by the suprarenals themselves, for the same fact holds good for the suprarenals. It passes off almost equally quickly if the aorta and vena cava are tied in the upper part of the abdomen, so that there is no circulation of blood whatever in the abdominal organs. It is not oxidized or otherwise destroyed by the blood, for it retains its full potency even after it has been twenty-four hours in contact with that fluid. The most probable explanation of the disappearance of the effect seems to be that the active principle becomes packed away, and eventually rendered innocuous in certain organs. That the muscles take most part in this storage is probable from the fact that the physiologic effects upon the skeletal muscles are manifested for a long time after the effects upon the heart and arteries have disappeared.

One of the most interesting and important facts regarding the material that is yielded by the suprarenals is the minuteness of the dose that is necessary to produce these results. As little as 0.0055 g. of dried suprarenal is sufficient to obtain a maximal effect upon the heart and arteries in a dog weighing 10 kilograms. For each kilogram of body-weight, therefore, all that is necessary to produce a maximal effect is 0.00055 g., or little more than half a milligram.

It has been shown that the active principle is contained only in the medulla of the gland, not in the cortex, and the medulla in all probability does not form more than one-fourth of the capsule by weight. Of the dried medulla certainly not less than nine-tenths is composed of proteid and other material which is not dialyzable, and which otherwise does not conform to the chemic properties that have been ascertained to belong to the active substance of the gland. So that, if these facts are taken into consideration, it is found that in order to produce a maximal effect a dose of not more than fourteen-millionths of a gram per kilogram of body-weight is all that is necessary. It is certainly true to say that one-fourteenth of this dose will produce some effect, although not perhaps a very large one. The astounding conclusion is thus arrived at that the active principle of the suprarenal capsules, taken in the proportion of not more than one-millionth part of a gram per kilogram of body-weight, which would be equivalent to $\frac{1}{18000}$ g., or less than $\frac{1}{800}$ grain, for an adult man, is still sufficient to produce distinct physiologic results upon the heart and arteries.

It may be considered probable that the suprarenal capsules are continually secreting into the blood this active material which, although present in that fluid in only minute quantities, may yet be sufficient to produce an effect which is beneficial for the performance of the functions of muscular tissue, and especially the muscular tissues of the vascular system. It has, in fact, been stated that the blood of the suprarenal vein contains a sufficient amount of the active principle of suprarenal extract to produce marked physiologic effects. Dr. Schäfer has made three very careful experiments in an endeavor to confirm this statement, but he has not been able to find that the blood of the suprarenal vein does actually contain a sufficient amount of this material to produce, even in doses of as much as 10 c.cm., any more result than venous blood generally. But whether it can be shown, experimentally or not, there is very little doubt of the fact that the materials formed pass somehow or other into the blood; and, when the results of suprarenal injection are compared with the converse effects obtained from the removal of suprarenals and from disease of those organs, no other conclusion can

be reached than that we have here a notable instance of internal secretion.

The general results to which we are led from a consideration of these facts point very strongly in favor of the notion that internal secretions are yielded both by the ductless glands and by what are usually known as the true secreting-glands, and that such internal secretions may be of no less importance than the better recognized functions of the external secreting-glands. That failure of one or other of these internal secretions may occasionally have to be reckoned with by the physician there can be no doubt, while on the other hand the therapeutist will be able to avail himself of the active principles which the internally secreting organs afford, and in certain cases to use their extracts in place of the hitherto more commonly employed vegetable medicaments.

That the subject has a vast future there can be little hesitation in predicting, for, in spite of the advances that have been made in elucidating it during the last few years, very many points still remain obscure. Nevertheless, the way the physiologist has attempted to show may now safely be followed by the practitioner, and the results of these physiologic experiments, as well as clinical and pathologic observations in the same direction which are steadily accumulating, cannot fail to throw light upon and to assist in the diagnosis and treatment of many ill-understood symptoms of disease.

NEWS ITEMS.

The American Dermatological Association will hold its nineteenth annual meeting at the Windsor Hotel, Montreal, Canada, September 17, 18, and 19, 1895. The following program has been arranged: Address by the President, Dr. S. Sherwell. Angiokeratoma of the Scrotum; Raynaud's Disease of the Ears; Report of cases, by Dr. J. A. Fordyce. Two Cases of Hydroa Vacciniforme, by Dr. J. E. Graham. Two Cases of Bromid Eruption, by Dr. G. T. Jackson. The Value and Limits of Usefulness of Electrolysis in Dermatology, general discussion. Dermatological Notes, by Dr. W. A. Hardaway. The Epitrichial Layer of the Epidermis and its Relationship to Ichthyosis Congenita, by Dr. J. T. Bowen. Remarkable Drug-eruption, by Dr. F. J. Shepherd. A Hitherto Undescribed Sequel of Non-parasitic Sycosis, by Dr. J. A. Cantrell and Dr. J. F. Schamberg. The Infected Scratch and Its Relations to Impetigo and Ecthyma, by Dr. H. G. Klotz. A Contribution to the Study of Mycetoma, by Dr. J. N. Hyde. Unusual Papulo-pustular and Fungating Bromid of Potash Eruption in a Baby, by Dr. G. T. Elliot. An Etiological Puzzle, by Dr. J. C. White. Studies on Some Dermatological Subjects, by Dr. A. R. Robinson. A Unique Case of Agminate Folliculitis of Parasitic Origin, by Dr. M. B. Hartzell. Note on Antiparasitic Treatment of Eczema, by Dr. J. Zeisler. The Treatment of Erysipelas Based Upon a Second Series of Fifty Cases, by Dr. C. W. Allen. Notes on Drug-eruptions, by Dr. J. A. Fordyce. A Further Study of Alopecia Præmatura and Its Most Frequent Cause, by Dr. G. T. Elliot. The Prevalence of Germ-dermatoses, by Dr. J. C. White. Symbiosis of Cutaneous Eruptions, by Dr. J. Zeisler. Sleep in Its Relation to Diseases of the Skin, by Dr. L. D. Bulkley. Exhibition of Photographs of Unusual Cases, by Dr. H. W. Stelwagon. (Title to be announced), by Dr. S. Lustgarten. Urticaria Pigmentosa. Case twenty years under observation, by Dr. P. A. Morrow. Note on the Elastic Circular Bandage, by Dr. G. H. Fox.

The Mississippi Valley Medical Association will hold its twenty-first annual meeting at Strassburg's Academy, Detroit, Michigan, September 3, 4, 5, and 6, 1895. In addition to the elaborate scientific program that has been prepared, generous provision has been made for social entertainment, and the meeting promises to be a most successful one. The usual reductions in railway-fares have been secured and ample hotel-accommodations provided for.

The Medical Examining Board of Virginia will begin its examination of candidates for licence to practise in Virginia, in Wytheville, promptly at 9 A.M., Tuesday, September 3, 1895. The Board itself will meet at 8 P.M., Monday, September 2d, for business. All letters with reference to this Board and the examinations should be addressed to the Secretary of the Board, Dr. Benjamin Harrison, Franklin and Seventh Streets, Richmond, Va.

Dr. Kurt Schimmelbusch, a rising young surgeon of Berlin, died August 2d, at the age of thirty-six years.

Dr. James W. H. Walker died August 20th, aged twenty-four years, while bathing at Wildwood Beach.

For the James E. Reeves Fund we have received from Fred Volz $1; Dr. N. W. Leighton, $2.

BOOKS AND PAMPHLETS RECEIVED.

Abstract from the Second Annual Report of the Dairy and Food Commissioner of Pennsylvania. Report of Analytic Work. By Henry Leffmann, A.M., M.D., Chemist to Dairy and Food Commissioner of Pennsylvania.

Peculiar Perversion of the Color-perception. By Homer E. Smith, M.D. Reprinted from the Medical Record, 1895.

Angio-sarcoma of the Ovary. By Thomas S. Cullen, M.B. Reprinted from the Johns Hopkins Hospital Bulletin, 1894.

Tumor Developed from Aberrant Adrenal in the Kidney. By Thomas S. Cullen, M.B. Reprinted from the Johns Hopkins Hospital Bulletin, 1895.

Is the Physiognomy of the Fundus Oculi in Epilepsy Characteristic? By Wendell Reber, M.D. Pamphlet. Pottsville, Pa.

Vegetable Nucleo-toxin in the Treatment of Cancer. By J. E. Chambers, M.D. Reprinted from the St. Louis Courier of Medicine, 1895.

Two Cases of Mastoid Abscess following Acute Middle-ear Inflammation; Operation; Recovery. By George C. Stout, M.D. Reprinted from the Philadelphia Polyclinic, 1895.

A New Method of Examination and Treatment of Diseases of the Rectum and Sigmoid Flexure. By Howard A. Kelly, M.D. Reprinted from the Annals of Surgery, 1895.

The Etiology, Pathology, and Treatment of Intestinal Fistula and Artificial Anus. By N. Senn, M.D., Ph.D., LL.D. Reprinted from the American Journal of Obstetrics, 1894.

Endometritis: Its Clinical Importance and Treatment by Curetting. By T. Griswold Comstock, Ph.D., M.D. Read before the St. Louis Society of Homeopathic Physicians and Surgeons, November 17, 1894.

Exfoliation of Cochlea, Vestibule, and Semicircular Canals. By M. A. Goldstein, M.D. Reprinted from the Annals of Ophthalmology and Otology, 1895.